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THE PROPER DIVISION AND FIXATION OF THE SKIN FLAPS IN THE OPERATION FOR CICATRICIAL ECTROPIUM TO PREVENT RE-EVERSION.

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(*With two figures on Text-plate III.*)

THOUGH the immediate result of operations for cicatricial ectropium may be very beautiful and the lid borders in perfect apposition, we find usually in the course of a few weeks or months the lid partly or completely drawn away again from the eyeball. After the operation on the lower lid this result is the rule, no matter what operative method was pursued. It is very easy to understand the cause of these frequent partial or complete failures. Cicatricial ectropium cannot be relieved without transplantation of skin flaps; but all transplanted flaps shrink more or less and exert in proportion to their shrinkage a traction upon the skin to which the edges of the flap are attached. The more movable this skin, the more readily it will follow the shrinking flap and the greater will be the contraction of the latter.

In the case of cicatricial ectropium, one edge of the transplanted skin flap is attached to the lid border, its other edge to the skin near the eyebrow or the cheek as the case may be. In either case the lid border is the most movable part; it offers the least resistance to the shrinking flap and is, therefore, easily displaced by it. This is particularly noticeable in ectropium of the lower lid, because it is so much easier for the shrinking flap to pull the lid down than to draw the skin of the cheek up. The lid, therefore, is

everted again, the degree of ectropium depending solely on the amount of the contraction of the flap. As this shrinkage of transplanted skin flaps is inevitable, the recurrence of ectropium is almost a matter of necessity as long as we allow the traction of the shrinking flap to act with full force directly upon the lid border. But the lid will not be displaced and everted again if we put it beyond the influence of this traction force. This can be done, as I have convinced myself in a sufficient number of instances, if, instead of covering the whole wound with one large flap, we divide the wound area into two sections, the one representing the surface of the lid, the other section the wound surface beyond the lid, and cover each section with a separate skin flap; and, furthermore, anchor the flap covering the lid surface (which we may call lid flap) so securely that the contraction of the other flap can have no effect upon it.

In cicatricial ectropium of the upper lid several ways are open to reach this desired end. If the eyebrows are absent, we can utilize the cicatricial skin above the border of the everted lid for the lid flap, as I have described in 1896 in these ARCHIVES (vol. xxv., p. 295). A semicircular flap of suitable size, the basis of which is the free lid margin, is outlined in the cicatricial skin and dissected off down to the lid margin; and after the reposition of the lid, the edge of the lid flap is united with the upper border of the tarsus by three or four silk sutures.

If this plan cannot be adopted on account of the eyebrows, we make an incision close along the lid border and after the reposition of the lid provide for a lid flap from some other source. Wolf's flaps and Thiersch grafts are the most available material. I give preference to the Thiersch graft on account of its thinness and lightness; it adapts itself very nicely and evenly to the surface and does not interfere with the movements of the lid on account of its light weight. Such a graft of suitable dimensions cut from the skin of the arm is smoothly spread out over the lid surface and fastened by fine silk sutures to the skin edge of the free border on the one side, and to the upper border of the tarsus on the other side.

After the lid flap of one kind or other is secured in its place, the lid margin is drawn down beyond the horizontal line as far as possible and held in this position by two ligatures passed through the free margin and fixed on the cheek by plaster strips or collodion. This is done for two purposes: first, to immobilize the lid, and, secondly, to stretch the wound surface of the supratarsal region to its fullest capacity. Over this wound then a suitable Thiersch graft is spread so that its edges lap over the surrounding skin; no sutures are used.

The advantages of the division and fixation of the skin flaps here described are obvious: The lid flap cannot shrink very much because its edges are fixed to firm unyielding points, the upper and lower borders of the tarsus; and its contraction cannot turn the lid over, because to do so the traction force must have a fixed point of purchase outside of the lid. The contraction of the skin flap of the supratarsal region, which has a point of purchase outside of the lid, cannot exert any disturbing effect upon the lid margin because its traction is not transmitted to the lid flap as this is so securely anchored to the upper tarsal border that it cannot be stretched or drawn upwards by the contraction of the other flap. If the latter should shrink very much its excessive shortening may draw the whole lid upwards and prevent its perfect closure during sleep, but under no circumstances can it cause a re-eversion.

In cicatricial ectropium of the lower lid the same plan of division and fixation of the skin flaps can be carried out successfully, only with this modification, that the lid flap is not anchored to the tarsus but to the tarso-orbital fascia. The tarsus of the lower lid is very small, and normally the lid skin reaches farther down than the lower tarsal border to a slight furrow a little above the infraorbital margin, where the integument passes from the upright plane of the lid into the sloping surface of the cheek. This normal boundary between lower lid and cheek must be re-established, and therefore the lid-flap must not be united with the tarsus but fastened to the tarso-orbital fascia in a line a little above the infraorbital margin. As the fascia is the anatomical contin-

uation of the tarsus, the lid flap thus fixed lies entirely within the boundaries of the lid, and its contraction has no tendency to evert it. And the shrinkage of the large flap on the wound of the cheek is prevented from pulling on the lid margin and causing re-eversion because its traction cannot reach beyond the firm union of the lid flap with the fascia. No amount of traction of the cheek has the slightest effect upon the lid flap or the lid margin.

In cutting the lid flap from the cicatricial skin always present below the everted lower lid, we must bear in mind that this skin contracts considerably as soon as it is dissected up. In order, therefore, to obtain a flap of suitable size, we begin the incision one centimetre below the inner canthus, carry it obliquely down into the cheek to a point about three cm. below the centre of the everted lid margin, then we continue it in an oblique direction upward and outward to a point (*b*, Fig. 1) even with and one centimetre from the outer canthus. This large flap is then dissected up from the underlying scar tissue, and all cicatricial strands and bands are cut until the lid is freed and can be turned up.

The next step is to reduce the overstretched lid margin to its proper length by removing a suitable piece of the lid (except the conjunctiva) near the outer canthus by cutting from *a* to *c* along the lid margin and from *c* to *d* through the flap; the edges *cd* and *ab* are then united by two silk sutures.

Now the lid is drawn up as far as possible and held in this position by two silk ligatures passed through the free margin and fastened on the forehead by adhesive plaster or collodion. This done, the edge of the lid flap is anchored to the tarso-orbital fascia by silk sutures (Fig. 2). The lid flap should be evenly spread out so as to be in perfect contact with the wound surface; but we must carefully avoid any undue stretching, and should we find that the flap is a trifle short and would be stretched if the sutures are placed very near the infra-orbital margin, it is better to put them through the fascia one or two millimetres higher up. For if the lid flap is unduly stretched, its subsequent contraction would unquestionably produce sufficient tension to draw the lid

margin down and to cause a slight ectropium. Finally, the wound surface below is covered with a Thiersch graft, the edges of which are made to lap over the surrounding skin. No sutures.

The after treatment is the same for the upper and lower lid. Strips of gutta percha protective are laid over the flaps and upon these a suitable gauze compress wrung out of warm boric acid solution; this is covered by one large piece of protective to prevent evaporation, and over this a layer of cotton to maintain uniform warmth. This whole dressing is secured in place by a roller bandage and left undisturbed for three days. Then it is carefully removed, the flaps are thoroughly cleansed, the overlapping edges of the large flaps are trimmed, and a new dressing is put on, which is changed every day or two as circumstances may require. At the end of the first week the ligatures and the sutures of the lid flap may be removed; during the second week some simple dressing (like borated vaseline) is kept over the flaps, and after this period no further treatment is required.

CHRONIC EMPYEMA OF THE ETHMOIDAL AND FRONTAL SINUSES, WITH EXOPHTHALMOS; OPERATION; DEATH FROM MENINGITIS; AUTOPSY.[1]

By Dr. ARNOLD KNAPP.

M. P., thirty-four years old; has never had any discharge or occlusion of the nose. According to the patient, seven years ago a swelling appeared near the nose, pushing the eye out. This was operated upon. She ceased treatment before the wound was closed and was comfortable until two years ago, when the condition recurred. This was again relieved by a slight operation. The old condition returned and became more accentuated two months ago, when she experienced severe headache and diplopia.

On admission, a heavily-built, healthy woman. The left eye is pushed out and down by an elastic, painless, round swelling, occupying the inner and upper walls of the orbit. V $\frac{20}{20}$. Od. normal. The nose is clean. No discharge. No hypertrophies; the outer wall of the middle meatus is bulging inward.

Operation, Sept. 18, 1902.—Curved incision along upper and inner orbital margins. In separating the periosteum at the orbital margin, a cavity is opened and a great quantity of thick, chocolate-colored fluid is evacuated. On wiping this dry, the cavity is seen to be formed by the dilated frontal and ethmoidal sinuses extending over the orbit and bounded internally by the inner wall of ethmoidal labyrinth. The outline of the middle turbinal is distinctly visible. The floor of the frontal sinus shows a large central defect; an irregular plate of bone remains at the anterior, external, and posterior margins. The orbital periosteum is thickened and fills in this defect. The os planum is completely

[1] Read with demonstration of specimen at the meeting of the Section of Rhinology, etc., New York Academy of Medicine, February 25, 1903.

gone; the ethmoidal labyrinth, except for the presence of a few posterior ethmoidal cells, is converted into a bone cavity, showing only an inner and lower wall (middle turbinal). The entire area is lined by a very thin membrane, the old mucous membrane. The bone underneath is smooth. At the edges posteriorly and externally diverticula and septa remain which are smoothed away. The frontal sinus has no lining membrane, and the bone appears superficially diseased, brownish, and can be peeled off like parchment (tabella vitrea). A broad opening is made into the nose, throughout the middle meatus, and the middle turbinal is completely removed. Anteriorly the nasal process of superior maxilla is partly resected. Some of the posterior ethmoidal cells, situated far back and next to the septum, are apparently diseased and are opened up externally. The wound is packed from in front.

Sept. 19th.—T. 100.6°. P. 90. Complained somewhat of headache. Vomited a considerable quantity of blood.

Sept. 20th.—Complained of her throat and also her stomach. Some headache. T. went up to 103.6°. P. 112.

Sept. 21st.—A restless night. Complained of pain in the right eye and headache. T. remained at 103°. In the afternoon slightly delirious. Pain in the back of head and neck. Swallowing difficult. In the evening became restless and attempted to get out of bed.

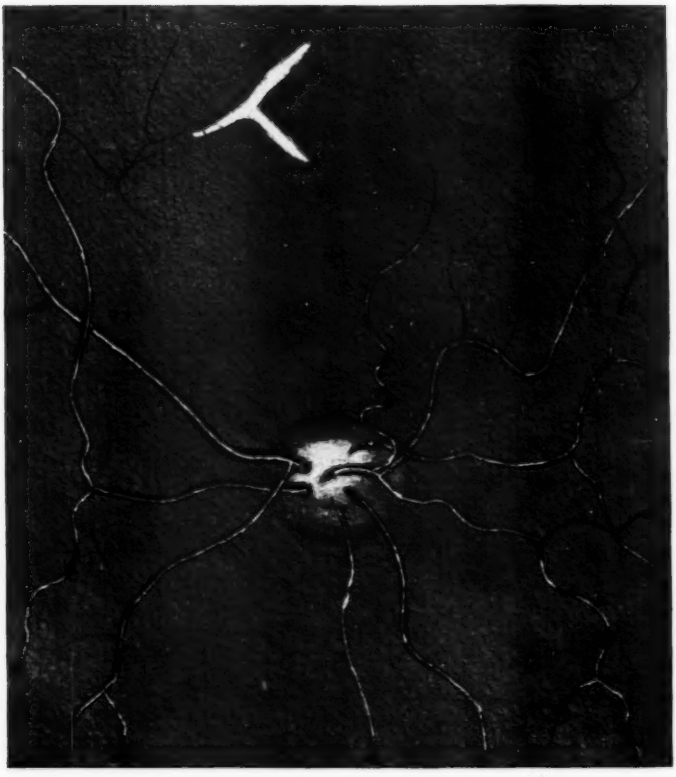
Sept. 22d. — T. rose to 104°. P. 100. Partly delirious, though answers questions. Very restless, complains of pain in the head. Palpation of back of neck painful. The wound was dressed. Gauze removed. There seemed to be no retention of pus. The cerebral wall of the frontal sinus healthy. The nose was irrigated. In the afternoon the condition has not changed. She has taken nourishment. The left pupil was found dilated. No change in the eye ground.

Sept. 23d.—Restless during the night except when under the influence of morphine. At six o'clock in the morning her condition became suddenly very much worse. Later her breathing was more rapid. T. 106°. Pulse could not be counted, and at 10 A.M. she died.

Autopsy, 8 P.M.—After removing the calvarium, the dura appeared normal. There was purulent meningitis over the convexity, more on the left than on the right side. On lifting the base of the brain, the right olfactory bulb was found imbedded in

pus. A very pronounced purulent collection was situated further back, surrounding the pons and the anterior extremities of both cerebellar lobes. Pus was seen to continue into the spinal canal. The ventricles contained cloudy fluid. The brain itself and the sinuses were normal. On examining the dura on the floor of the anterior cerebral fossa a small coagulum of blood and pus was seen to cover an opening in the membrane at the posterior extremity of the left cribriform plate. The opening in the dura was round, 2–3 *mm* broad, with thin and discolored margins. The roof of the orbit and of the nasal cavities was removed, showing the defect in the left orbit produced by the operation. There was no retention of pus. The septum and horizontal wall, roof of ethmoidal cells, and orbit remain; there are a few posterior ethmoidal cells. These and the adjoining mucous membrane are covered with discolored granulations, which at one point passed through the bony roof of the lamina cribrosa to the under surface of the dura. The posterior wall of the frontal sinus was normal. The sphenoidal sinus was opened and found healthy. The right cribriform plate was also healthy.

REMARKS.—The active process in this case was a disease of some of the posterior ethmoidal cells, which appear to have been closed off by the dilated empyematous cavity, obstructing drainage and causing an extension upwards, as shown by caries of the lamina cribrosa and circumscribed pachymeningitis. These latter changes are of some duration and presumably not produced by the operation. At the same time there is no question but that the operation started the meningitis under the existing diseased conditions. Examples of the lighting up, so to speak, of a latent meningeal process are not unusual.



T-shaped isolated rupture of the choroid near yellow spot, with normal acuteness of sight.

Y-SHAPED RUPTURE OF THE CHOROID IN THE MACULA REGION WITH RETENTION OF GOOD VISION.

By Dr. J. J. MILLS, of Baltimore, Md.

(*With text plate IV.*)

J. C., aged about nineteen years, a student from W. Va., consulted me June 16, 1902, on account of an injury to the right eye, which had occurred two days before whilst playing baseball. He was struck over the right eye by the flying ball and knocked down. He was not rendered unconscious, but stunned for a few moments. Upon recovering he found himself quite blind in this eye. Some domestic remedies were applied by one of the instructors of his college. The eye soon became painful and he was brought to me two days after. Upon inspection there was found a moderate degree of circumcorneal injection, pupil dilated, anterior chamber shallow, and about one third filled with blood. Vitreous hazy with floating opacities, so that no view of the fundus could be obtained. There was no external injury to the globe, and tension was normal. Shadow perception alone remained. A collyrium of atropia and bandages were applied and opium stupes ordered. June 18th, globe less injected. Opacity still obscured the fundus. Fingers seen at three feet. Iodide of potash in 10-grain doses given three times daily. June 19th, fingers at nine feet with difficulty. June 27th, fingers at thirteen feet and eye diverged. Indistinctly, in macula region, whitish streaks could be made out which I believed to be due to choroidal rupture. All inflammation having subsided, he was now permitted to return to his home, but with a bad prognosis as to the future usefulness of the eye. He returned to me on July 14th; his right eye had now resumed its normal position. Pupil still slightly dilated. Upon examination of fundus, media are all

found perfectly transparent, and a Y-shaped rupture of the choroid, at the posterior pole, is now distinctly visible. The macula is situated between the prongs of the Y. Vision is a little over $\frac{20}{20}$, or about the same as before the injury.

The accompanying plate was drawn by me at this sitting, that is, about a month after the injury. This case is interesting not only from the shape of the rupture, but from the fact that the macula region was so closely embraced by the injury, and vision unaffected.

A CONTRIBUTION TO THE PATHOLOGY OF ANOMALIES OF THE VESSELS AND THE FORMATION OF STRIPES IN THE RETINA.

By Dr. RUDOLF SCHILLING, Freiburg-in-Br.

(*With Plates I.–II. of Vol. XLIII., German Edition.*)

Translated from *Arch. f. Augenheilkunde*, xliii., March, 1901, by Dr. Ward A. Holden.

THE ophthalmologist finds not infrequently a tortuousness of the retinal vessels without being able to discover a direct cause for it in the condition of the fundus otherwise. This tortuousness of the vessels has always excited considerable interest, and recently has received much attention in literature. According to Gloor (21), to whom we owe one of the latest and most exhaustive papers on the subject, the matter has not been sufficiently discussed in literature, and therefore the presentation of new cases seems justifiable.

Through the kindness of Professor Manz and Professor Baas I had the opportunity of studying and making drawings of two cases of this sort which were distinguished by their combination with peculiar stripes in the retina.

Case 1 (Fig. 1, Plate I.).—P. S., aged nineteen, a carpenter. Father living and healthy. Mother died of cancer of the stomach. As a child the patient had frequent eruptions on the head. In April, 1899, he had an attack of typhoid and remained seven weeks in the hospital. Since then he has always been feeble, has severe headaches and frequent vertigo when he stands. At times he has convulsions with loss of consciousness. It is said that he was run over by an electric car, causing injury of his foot and

long-continued loss of consciousness. Since then he has had about ten other attacks.

August 2, 1899, he was admitted to the medical clinic with recurrent typhoid. In the hospital he had further attacks in which he gritted his teeth, rolled his eyes, twisted his body, and exhibited opisthotonus and striking movements with his legs and arms.

November 29th, he was sent to the eye clinic to have the fundi examined. Discharged here on December 1st, he soon returned to the medical clinic on account of his headaches, and remained there until January 2, 1900.

August 2, 1899.—A man of medium constitution, anæmic, with pale mucous membranes. Thorax well shaped. Sounds at the apices of the lungs equal. Limits of heart and lungs normal.

October 2d.—No hyperæsthesia for a needle prick on the body, but sensitiveness on the head. Tapping the occiput or forehead causes pain radiating back through the entire head. The facial nerve normal on each side; the tongue protrudes straight. Motility of the limbs normal, except that the toes of the left foot since the accident are harder to move than those of the right. Strength fair. Standing with closed eyes there is a tendency to fall backward. No ataxia. Knee-jerks present.

October 5th.—The right upper lid droops. The right naso-labial fold is less pronounced than the left when the teeth are exposed. Continual complaint of headache.

October 30th.—Facial paralysis scarcely noticeable. No ptosis.

Diagnosis.—Hysteria, cephalalgia nervosa. Recurrent typhoid.

Condition of the eyes, November 30th. — Externally normal. Pupils respond well. Media clear. R V = $\frac{6}{30}$, L V = $\frac{6}{6}$. Visual field : L normal limits ; R slight contraction for green. Central scotoma for blue, red, and green and increased size of the blind spot for each eye.

Ophthalmoscopic (Fig. 1).—Right eye. The disc is of a grayish-white color. The blurred margins pass over into the surrounding retina which near the disc is cloudy, partly diffusely, partly in stripes. The area between the disc and macula is grayish-white with red showing through here and there. The macula itself is occupied by a more intense, differently shaded opacity, whose temporal margin is bounded by a vertical silvery stripe. From the disc some small tortuous vessels run nasally and temporally, partly concealed near their origin by the white tissue of the disc.

The point of exit of the large vessels is covered with a grayish,

brownish-red plaque with its base in the middle of the disc and projecting to a pointed termination forward in the vitreous. The arteries pass from the disc in their usual course, but a tortuous branch is found in the upper temporal quadrant, and a smaller one runs toward the macula. All the veins, on the contrary, either near the disc or farther away, are very tortuous, but all lie in the plane of the retina. Their peripheral terminations are very tortuous and sometimes of corkscrew shape. The veins are here and there looped about the arteries and anastomose among themselves.

Besides these vascular anomalies the fundus exhibits peculiar white stripes which are more or less in connection with the vessels. The trunk of the upper artery is bordered on each side by a white line extending from the disc and passing over the vein where it crosses before the artery. This white stripe follows the temporal branch of the artery without immediately joining it. Later it separates entirely from the artery and follows the main vein as a broad stripe. The white stripe here is bordered by lines of pigment particularly below where the pigment forms little arched figures. From the point where the vein breaks up into its tortuous branches the white stripe describes a regular curve in the retina and ends in two branches. In this part of its course it runs partly under and partly over the veins. A second stripe without connection with the disc appears on a second branch of the artery, then passes to a vein, and dividing follows two branches of the vein. In the periphery are some independent white stripes, partly free, partly lying on venous branches.

The inferior temporal artery and veins are in their beginning surrounded by a broad white stripe which extends with a broad base from the opacity in the disc. Then it passes downward, filling the space between the artery and the first lateral branch of the vein, and divides at the intersection of the vessels mentioned into two stripes, one of which runs downward, passing beneath the main vein, and reaches a venous branch which it accompanies both above and below.

The upper broader portion of the stripe continuing the direction of the original stripe accompanies the artery first along its upper margin and then along the lower, then divides where the venous branch winds round the artery; the former runs some distance upward while its direct continuation following the artery passes over abruptly into a broad white patch partly covered with

pigment. This is a line of pigment running parallel to the stripe, curved at its ends, and composed of small masses of pigment. At its end near the disc it passes into a line of pigment running downward obliquely beneath the vein. Here also the peripheral veins are bordered by longer or shorter free-lying stripes. The infero-nasal vein also is accompanied by a white stripe which appears first on one side of the vessel then on the other.

The stripes have a dull grayish-white color, particularly near the disc. Further in the periphery they assume a more tendinous lustrous white color and appear in part to be composed of several bundles of fibres.

Left eye.—Disc scarcely veiled, no vascular changes. In the posterior portion of the vitreous a grayish-white opacity and a punctate similar opacity in the macula.

CASE 2 (Fig. 2, Plate II.).—Mrs. A. L., aged fifty-eight, admitted to the clinic June 21, 1898. Father died of ascites, mother of an affection of the lungs, a brother of an intestinal disorder, and two sisters of phthisis. Three others of the family are alive, but not altogether well. The patient was healthy as a child. At the age of thirteen, inflamed eyes—which were healed without affecting vision—and enlarged glands. Married at twenty-six. One healthy daughter. No miscarriages. For some months twitching of the face not accompanied by twitchings elsewhere, and gradual diminution of vision, particularly in the left eye, so that now she cannot read with this eye. Fluttering before the left eye. No headache.

June 21st.—R V = $\frac{6}{7}$ with − 1. L V = $\frac{1}{3}$ with − 1.

Left: central scotoma.

Pupils react normally. Tension in both eyes normal.

Several old scars are visible at the margin of each cornea. Media clear.

Ophth.—Right: disc slightly reddish, with a flat excavation. Vessels normal.

Left: disc of normal color, flat excavation. Veins slightly enlarged and tortuous. Arteries normal.

In the macular region and below yellowish foci. About the disc are many old extravasations. Here and there in the foci absorption is manifested by the presence of pigment masses. The hemorrhages lie particularly along the course of the veins.

June 24th.—R V = $\frac{6}{7}$ with − 1. L V = $\frac{1}{30}$ with − 1.

June 26th.—Heurteloup.

June 30th.—L V = $\frac{1}{30}$ with − 1. The extravasations of blood are largely absorbed and partially transformed into gleaming white masses. The venous congestion is less, the arteries are better filled.

July 7th.—L V = $\frac{1}{15}$ with − 1.

July 22d.—L V = $\frac{1}{15}$. The temporal portion of the disc is pale and somewhat atrophic. The foci in the macula have been absorbed and only here and there are small remains of blood visible.

July 24th.—Discharged with directions to take iodide of potassium.

April 4, 1899.—L V = $\frac{1}{5}$. Optic disc atrophic, above and below linear hemorrhages. Long white stripes sometimes overlying the vessels.

November 11th.—R V = $\frac{5}{7}$ with − 1. L V = $\frac{1}{5}$. L. ophth.: partial atrophy of the disc up and in. In the upper-inner quadrant of the retina white formations with tortuous veins over them. At the macula choroiditic pigment degeneration.

December, 1899. Ophthalmoscopic picture (Fig. 2). Left eye: The disc is pale, with a flat excavation up and out. About it is a reddish-gray zone which passes over without a sharp line of demarcation into the normal color of the retina. The macular region is partly atrophic with accumulations of pigment. Similar punctate and linear pigmented foci are to be seen in the upper nasal and temporal quadrants. Besides these one sees some narrow, dull, yellowish-white stripes in the deep layers of the retina, extending toward the disc but not reaching it.

One's attention is chiefly attracted, however, by a peculiar-shaped white figure in the inner-upper quadrant, following the course of two veins. These two veins arise from the upper-inner portion of the disc and pass somewhat divergent upward. They appear rather small and lack a definite light reflex. The vessels branch at about the same distance from the disc, and the terminal branches run through a network of stripes of a milky-white color. From this network white stripes run back along the adjacent margins of the two veins. The connective-tissue mass consists of an elongated plaque (see figure) sending out processes along the vessels.

Since the complexity of these cases offers some difficulty in interpretation, I wish to consider the tortuousness of the

vessels and the retinal stripes separately, and give a *résumé* of the literature, based on that presented by Gloor, but adding various cases which seem to me to fall into these categories.

The first description of this affection appeared in Mauthner's text-book, in 1867. He says: "The vessels at times present a marked tortuousness. Usually arterial and venous trunks running parallel are affected. The pulsating excursions may then be very evident, either on the disc or more frequently in the retina."

Mauthner adds an account of a case observed by Schirmer, in which, besides extensive teleangiectasias in various parts of the body and on the lids of the left eye, there were marked varicosities of the retinal veins, so that the curvings of the vessels were not only lateral but also antero-posterior. The arteries, in course and calibre, were entirely normal.

Magnus (42), in 1872, designated with the name "varicosities of the retinal veins" an anomaly of the fundus which, in respect of the tortuousness of the veins, had great similarity to the case described by Gloor (21).

The case reported by Samelsohn (62), in 1873, was in a man of forty-nine, whose vision in the right eye had been poor for two years, since a dark spot had appeared in his field of vision. Besides sclerectasia and a dark movable opacity of the vitreous, two red spots were seen in the lower portion of the disc, which had the appearance of extravasations of blood, but proved to be convolutions of small vessels springing from the two superior venous trunks. Both of these trunks farther from the disc were tortuous, and at two points there were evidences of other newly developing branches. In the lower half of the disc one large vein turned back in its course, and the other broke up, just after entering the disc, into four branches, one of which appeared to be in direct connection with an arterial vessel.

Jakobi (33) reported, in 1874, three cases of partial abnormal tortuousness of the vessels.

The first was in a corpulent woman of sixty-six, whose vision had been poor for two years. In the right eye there was a red spot in the course of the vessel, apparently a

vein, which proved to be composed of convoluted vessels. It was not clear whether there was a plexus with anastomoses or simple tortuousness of the vessel.

In the second case he found in a feeble, unmarried woman of sixty-seven, who had poor vision and frequent frontal headaches, a marked tortuousness of two small veins near the disc.

The fundus of the third patient, an unmarried woman of eighty-six, with poor vision, exhibited near a choroidal plaque in each eye two large looped veins near the disc.

Chodin (11), in 1875, described a case of tortuousness of the veins, in a man of thirty-eight, with hyperopia and diminished vision, whose vision had been bad since childhood. The veins, which united on the disc to form a common trunk and appeared broader than normal, were tortuous in corkscrew fashion, and ran in different planes. The tortuousness began at some distance from the disc and increased toward the periphery.

Benson (6), in 1882, described a case of extreme idiopathic tortuousness of both arteries and veins.

In the same year Nettleship (49) reported two cases of marked tortuousness of the retinal veins in two eyes that were otherwise healthy.

Mackenzie (41) also, in 1882, reported a case of marked tortuousness of the retinal veins, in a man with emphysema of the lungs, and in the following year another case in the eye of a girl of twelve, who was hyperopic and had suffered with pains in the forehead.

Horrocks (31) found the retinal veins very tortuous in the right eye of a paralyzed girl, aged nine, with nævi of the face and conjunctiva.

Czermak (12), in 1883, described a case of prepapillary vascular loop in a weak girl of thirteen, with a small irregular prognathous skull and flat bridge of the nose. In the left eye, medullated fibres passed upward and downward from the disc. The arteries and veins were very tortuous. An artery passed forward from the disc in a spiral loop, and returning to the disc continued as the inferior temporal artery.

Hirschberg (29) presented a drawing of the right fundus

of a healthy man, whose left fundus was normal. In the left eye the retinal veins were looped and tangled so that they could scarcely be disentangled clinically. They did not, however, project into the vitreous.

Remak (61), in 1885, described three cases of persistent hyaloid artery in one of which the vessels were quite tortuous.

In 1886 Galezowsky (19) published a drawing of tortuous retinal veins seen in a woman with mitral insufficiency. The number of visible venous vessels seemed enormously increased. The arteries were normal and no other changes were noted.

Under the name "perivasculitis retinæ," Scheffels (63), in 1891, described a case of tortuousness of retinal veins in a boy of eighteen with hereditary syphilis. He observed first a whitish discoloration on the superior nasal vein. A week later the vessel, for a distance of 1 *p. d.*, seemed transformed into a uniformly broad gleaming white band. The course and calibre which before had been normal now changed. Centrally from the white area the vein was reduced to a thin filament. Peripherically it was dark red in color, dilated and enormously tortuous up to its terminal twigs, some of which lay in the retina and others were elevated above it. Analogous changes were later found in other veins. Under inunction treatment the changes gradually receded and the calibre of the vessels became normal, although the tortuousness remained permanently.

A unique case was described by Axenfeld (3) in 1894. The retinal veins for the most part ran toward the periphery and at the outer limit of the visible ophthalmoscopic field sank into the choroid, while the papillary veins were but slightly developed. I refer to this case because the latter veins were very tortuous.

Frost (17), in 1896, pictured a case of tortuousness not only of the veins but also of the arteries, and in other cases accidentally came across partial tortuousness of one or more veins.

In the same year Axenfeld (4) reported two cases of anastomoses after thrombosis in the region of the central vein.

1. A man of forty-eight with arterial sclerosis and the results of apoplexy. In both retinæ sclerosis of the arteries and obliterated veins. At many points tortuous anastomosing vessels connected the veins around the thrombosed areas so that there was no great stasis.

2. A man of sixty, with arteriosclerosis. Total thrombosis of the venous trunk supplying the inferior halves of the retinas. Within three months a large anastomosing vessel developed from a point peripheric to the thrombus and passed up to join the main superior vein.

In Oeller's (52) atlas (1897), Figure E, Plate VI., represents tortuous retinal vessels, the arteries being but slightly affected. Figure C, Plate VII., shows retinal veins tortuous in the periphery and of double their normal calibre.

Gloor (21), whose paper I have followed for the most part up to this point, in his publication in 1897, describes the fundus of a man of twenty-three, who had suffered for four years from cough and expectoration and for two years from hemorrhages. A week before the examination he noticed the sudden appearance of a cloud before the right eye.

Right eye normal externally. Opacities of the vitreous. Disc visible. Circumscribed hemorrhages at its nasal margin. In the macular region a large dark-red hemorrhage with lighter margins. Arteries narrow, veins very tortuous in the periphery of the fundus.

Left eye. In the disc a spirally twisted vein extending upward. Veins in the neighborhood of the disc relatively straight, but tortuous in the periphery. In looking to the right a convoluted vein is visible. Below, some veins are interrupted here and there by blurred gray patches. At places the veins are bordered with white lines. Many hemorrhages, one in the macular region. The tortuous veins here and there disappear in the hemorrhages and emerge again unchanged in direction.

Würdemann (78), in 1898, described a thrombophlebitis of the central vein with complete blocking in a boy of eight. The veins were dilated and tortuous and there were hemorrhages. Vision was lost and later there was proliferation of connective tissue on the disc, in the vitreous, and at the

ciliary region, and sclerosis of the tissues leading to glaucoma.

Elschnig (15) reported in 1898 two cases of anastomoses of the retinal veins.

The first was in a man of seventy-six with atheroma of the valves of the heart and albuminuria, who for five months had noticed a gradual diminution of vision, and had a mild attack of apoplexy, leaving a left homonymous hemianopsia.

In the fundus the beginning of the superior papillary vein had a greatly thickened wall and a peripheric twig was dilated. All the twigs of the superior papillary vein running toward the macula were connected by anastomosis vessels of different calibre, but all very tortuous. The twigs bending round the macula were in the same manner connected with the inferior temporal vein. In the left eye above the disc a small network of twisted small vessels passed from a retinal vein.

In the second case, likewise in an old man with arteriosclerosis, so far as the senile changes in the refractive media permitted them to be seen there were many tortuous vessels connecting different veins.

Eversbusch (16), in 1899, reported a very instructive case: There was a thrombosis of the central vein of the retina, caused by trauma, which had led to the formation of a plaque of new-formed tissue before the disc and to narrowing and obliteration of the trunks of the superior and inferior temporal veins and to convoluted anastomosing vessels in the region of these veins.

Levin (37), in 1899, observed a girl of eighteen with evidences of previous rachitis, who had had poor vision since childhood and in the course of years noticed a gradual failure of sight. The right eye was normal except for a hyperopia of 6. D. The left eye, otherwise normal, exhibited the following ophthalmoscopic picture: The disc was uniformly red, with blurred margins. At the nasal margin there were signs of radiating stripes. The retinal vessels, both arteries and veins, were remarkably tortuous, so that the tangle of crossing vessels had the Medusa-head appearance.

Shortly after their emergence from the disc, the main

branches divide and their twigs form numerous corkscrew curves, which can be followed to the extreme periphery. At many places the vessels cross and form large recurrent arches and loops. The curves all lie in one plane. The calibre of the veins appears to be increased and that of the arteries narrowed. The line of reflex is particularly broad on the veins. H + 7. D.

Pick (54) in the same year published two cases of bilateral tortuousness of the vessels.

The first was in a man of fifty-six with empyema. On both sides there were remains of pupillary membranes, hyperopia, (R + 5. D), and incipient cataract. Arteries and veins were excessively tortuous and offered a picture similar to Levin's drawing. The changes were more marked in the right eye than in the left.

The second case was in a man of fifty-four with empyema, catarrhal symptoms, and moderate arteriosclerosis. The eyes appeared normal externally, but the veins, which were apparently increased in number, were tortuous. The calibre seemed to be increased, but not uniformly along the course of the vessel. The corkscrew twistings did not lie in a single plane. In the left eye there was an anastomosis to the nasal side of the disc. Hemorrhages along the veins. Colloid excrescences at the macula. Emmetropia in both eyes.

Reimar (60), in his paper on embolism of the central artery, describes a case in which in the normal left eye the veins had an unusual branching and were abnormally tortuous on the disc, while in the right eye, besides the symptoms of embolism of the central artery, short dark-red lines on the disc were seen, which proved to be the superficial portions of an excessively tortuous vein, whose deeper parts were concealed by the cloudiness of the disc. The other portions of the vessel were of normal appearance.

Seydel (72) described and pictured the fundus of a woman of thirty-one, who suddenly saw a cloud before her right eye which markedly interfered with vision. There was marked tortuousness of the superior temporal vein and at intervals it had a chalky-white sheath. The larger temporal branch

broke up into small tortuous twigs, concealed for a distance by hemorrhages.

When, after this abstract of the literature, we seek the etiology of these vascular anomalies, we find that the attempted explanations are as numerous as the objective findings.

Pick (54) collects the clinical pictures according to their etiology and distinguishes congenital and acquired vascular anomalies, the latter being due either to local eye diseases or to general diseases.

To begin with, it should be remarked that tortuousness of the vessels may exist even under physiological conditions. Mauthner (44, p. 250) warns against regarding them as pathological. Schmidt-Rimpler (67, p. 236) says: "At times the veins, without other anomalies in the fundus, are tortuous and even varicose." Schweigger (70) says: "The veins run a less direct course than the arteries, and even in physiological conditions may be quite tortuous."

The criterion of a congenital anomaly, according to Leber (35, p. 521), is, that the curved vessels lie in a single plane and the loops do not extend forward as in hyperæmia.

In how far this statement is justified by anatomical and embryological conditions or by experience is hard to determine. One must suppose that when any force causes the retinal vessels to become tortuous the direction of the loops will depend upon the resistance; thus the vitreous comes into consideration, and normally this must offer considerable resistance. But in many pathological conditions it is easy to see how the resistance on the part of the vitreous might be greatly lessened. Then there are the persistent hyaloid arteries and the arteries which form a spiral loop in the vitreous and then return to the retina. Cases of the latter have been reported by Czermak (12), Hirschberg (29) Wachtler (74), Szili (73), Liebreich (40), Günsburg (25), Hirsch (27), Bondi (8). Hirsch (27) believes that there was a progressive series extending from the tortuous arteries of young hyperopes up to the loops in the vitreous so that one cannot believe the latter to have any connection with a persistent hyaloid artery. The analogy does not hold good,

however, so far as our cases are concerned, for the loops are from the disc and the tortuousness which we have been considering is chiefly in the periphery where there is no question of loops into the vitreous.

In respect of the location of acquired vascular tortuousness, the cases reported show that a constant rule is even less possible than in the case of the congenital variety, although the pathological process here is likely to cause an elevation of the vessels above the plane of the retina; in Elschnig's (15) case the anastomoses of corkscrew shape lay in the plane of the retina.

The other points distinguishing a congenital from an acquired tortuousness are, the bilateral nature of the anomaly, the participation of the arteries in the tortuousness, an increase in the number of the vessels, the location of the tortuousness, the formation of anastomoses, and finally the combination with other structural anomalies in the eye. Gloor considered the fact that the veins in both eyes were affected as an evidence of congenital origin. But it is known that other congenital vascular anomalies of the retina are frequently unilateral. Thus, for example, prepapillary vascular loops are in many cases unilateral, but again some are bilateral.

In regard to the division of the anomaly into arterial and venous cases there is no particular difference, since in many of the cases the veins alone were affected and in many both arteries and veins in equal measure.

Nor can an increase in the number of vessels be considered of diagnostic value, for it must be remembered that an abnormal fulness of previously invisible vessels may render them visible and thus an increased number of vessels be simulated.

Nor can the peripheric location of the tortuousness be regarded as evidence of its congenital nature, since in Scheffel's (63) case in which the pathological nature of the tortuousness was proven, the anomaly though existing in almost all the veins of the two eyes was found only in the periphery.

In respect of the formation of anastomoses it may be said that they are of little importance, since Gloor says: "When

one knows what important rôles are played by anastomoses in the nervous system in general, one will readily understand that they may occur with the slightest disturbance."

A certain diagnostic value appertains, however, to the simultaneous occurrence of other developmental anomalies in the eye, as for example Czermak's (12) case with abnormal conformation of the face and skull, epicanthus, medullated nerve fibres, and prepapillary vascular loop; Remak's (61) case with persistent hyaloid artery, Pick's (54) and Levin's (37) cases with remnants of pupillary membrane and hyperopic pseudo-neuritis. That the last anomaly in particular stands in some relation to tortuousness of the vessels is evident, but the tortuousness in such cases is usually on or near the disc.

Still more difficult than the diagnosis of congenital vascular anomalies is the attempt to form an idea as to their cause and manner of development. We may here first advance the question with Axenfeld (3, p. 16): "Is there an anomaly in the strict sense of the word, the vessels being originally formed in their present location and size, or have we to do with a condition acquired in fœtal life?" In respect of the latter possibility there are three ways of explaining the condition: a limitation of space in the fœtal eye, a disturbance of circulation during development, and anomalies in the growth of the vessels.

As for the first point, Frost believes that the frequent association of tortuousness of the vessels with hyperopia permits us to suppose a causative relation between the two. Hyperopia means incomplete development, and the retina might remain in its early folded stage, and thus the vessels have an opportunity to become tortuous. One must then assume, as Levin remarks, that the folds later disappear while the tortuousness of the vessels remains. Landolt suggests another connection between the two anomalies, namely, that in consequence of the smallness of the highly hyperopic eye the vessels cannot extend to their normal length, and hence are tortuous. As for the second point, our knowledge of the development of the retinal vessels is still too incomplete to permit us to draw conclusions. As

for the third point, Gloor sees in the uniform involvement of all the veins an evidence of an active increase in the length of the vessels, and he contrasts these vascular anomalies with all those changes associated with dilatation of the vessel lumen which are secondary. In the earlier publications such a distinction was not made, in the nomenclature at least, since simple tortuousness of the vessels was described as "varicosities of the retinal veins" (Schirmer), and "varix-like tortuousness of the vessels" (Jakobi). Yet Jakobi (33) believed that the vascular tortuousness described by him was not a simple distension but due to an actual anomalous elongation, somewhat similar to plexiform and cavernous angioma.

At this point I would recall the interesting cases reported by Schleich (65) and Seydel (71), which probably are to be regarded as congenital arterio-venous aneurysms of the retinal vessels, and are of interest to us on account of the very great tortuousness of the vessels. The combination of tortuousness of the vessels with great dilatation of the lumen, as is well shown in these cases, seems to me to be an indication that a definite separation of these two vascular changes cannot be made. For although the latter may be referred to the conditions brought about by the arterio-venous aneurysm, still the possibility exists that in the development of this anomaly similar conditions obtain, as we have discussed them above from the point of view of the active increase in length.

If we now consider the causes which in later life lead to tortuousness of the retinal vessels, we come first to choked disc among the local ocular causes. In this state the veins are often dilated and tortuous, while the arteries are but slightly changed. The tortuous veins then lie in most cases in different planes. The deeper portions of the loops are frequently concealed by the œdema of the tissue.

In glaucoma also the compression and obstruction of the veins at the margin of the excavation cause tortuousness, mostly limited to their central portions.

Thrombosis of the veins and sclerotic changes in their walls, which bring about a slow blocking of the lumen, also

give rise to great tortuousness and the formation of anastomoses. Here either the veins are very tortuous behind the narrowed point, or anastomoses arise by one of two ways — either more or less tortuous vessels of longer or shorter course connect two different systems of vessels or distant portions of a single system, or spindle-formed twisted twigs connect a single vessel about its thrombosed section.

It is not possible to say in how far the anastomoses consist in the dilatation of existing capillary connections, and in how far upon the formation of new vessels. At any rate anastomoses are found only when there is a slow blocking of the vessel, for in Würdemann's (78) case, in which the blocking was sudden and complete, no anastomoses formed.

The cause of the thrombus may be a trauma from hemorrhage into the optic nerve or into the central canal of the vitreous exercising pressure on the central vein, or it may be due to perivasculitis.

The nature of these inflammatory processes, which through cellular infiltration of the circumvascular lymph sheaths and vessel walls lead to narrowing and gradual stoppage of the lumen, has been explained in but few cases. Scheffels (63) regarded the perivasculitis of the retinal veins in his case as the first manifestation of hereditary syphilis. Whether marantic thromboses and thromboses forming in the course of infectious diseases may be etiological factors we do not know. Nor should the arteriosclerosis, often observed, be regarded too frequently as the cause; for while the patients of Jakobi, Axenfeld, and Elschnig were old people with atheromatous changes, this cause was not likely to have existed in Seydel's young patient.

In what has preceded we have referred often to the view of Pick in regard to the relation of these vascular anomalies to general diseases. We may add that Galezowsky (19) regarded the initial insufficiency in his patient as a causative agency. Yet it is not certain whether here, as in Oeller's (52) case with leucæmia, it was not rather a casual concurrence of both affections.

If we now compare with the published descriptions the clinical picture in our first case, the patient Stocker, a cer-

tain similarity of the vascular symptoms with those in Gloor's case cannot be overlooked. The veins alone are tortuous, the anomaly is limited to the periphery of the retina, and the venous curves lie in the plane of the retina. In both cases there were anastomoses. Yet in our case there were wanting places where the trunk divided into fine branches, which formed a convolvulus and united to form a single trunk again. Another difference lies in the limitation of the affection to one eye, while in Gloor's case it was bilateral.

The process extending forward into the vitreous in our case is worthy of consideration. Comparison with similar structures suggests a congenital anomaly. The persistence of a hyaloid artery first suggests itself. Nor does the lack of a connection between the obliterated tract and the posterior surface of the lens speak against this supposition.

When we come to the consideration of the second ophthalmoscopic change—the connective-tissue strands and striæ in the retina, and look over the reports of similar cases in the literature, we find them in considerable number, and the varieties in which this condition appears have led many writers to undertake a classification of the material.

Accordingly one distinguishes prevascular, circumvascular, and retrovascular striæ, the last being divided again into retinitis striata after inflammation and striæ retinæ after detachment of the retina.

The first category is characterized by striæ which chiefly, if not altogether, lie anterior to the retinal vessels, in the retina itself, and extending thence into the vitreous. This definition is similar to that of the clinical picture which Manz (43) designated retinitis proliferans, and the question arises whether there is but a slight difference between the two clinical pictures, or whether there are marked differences. In order to discuss this question, I wish to offer a *résumé* of the cases reported.

The first mention of prevascular striæ was by Jakobi, in 1874, in the case already cited (33): "Furthermore, the retina contained whitish strands which appeared first on either side of the artery running downward and immediately

bordered the vessel and then united to form a single strand. These strands lay doubtless over the plane of the larger retinal vessels, as was evident when they crossed the vessels.

Berger (7), in 1882, described three cases of unilateral connective-tissue formation in the disc and retina.

In his first case, two lustrous tracts, composed of fibres running parallel in their long direction—one beginning near the inner margin of the disc, the other from the outer pigment ring,—converged above, and ended with frayed-out interlacing margins. These tracts lay near the inner surface of the retina and optic nerve, and were perforated by branches of the central vessels.

In the second case, two similar tracts extended out from the disc.

In the third case, a lustrous silvery tract was seen extending from the inner margin of the disc, tortuously in a horizontal direction over the connective-tissue ring, and ended with a broad, frayed-out end in the inner-lower portion of the retina. One artery and one vein of the central vessel system appeared through two perforations in this connective-tissue tract.

Schleich (66), in 1890, published a case in which, long after hemorrhages had taken place in the neighborhood of the larger retinal vessels and no trace of blood remained, a fine white tract was seen running from the disc along a vein toward the periphery in the left eye, while in the right a complicated system of white tracts was seen raised above the level of the retina, and extending from a large mass near the disc. There were small accumulations of pigment. Here also the vessels ran beneath the white stripes.

Banholzer (5), in 1892, described an interesting case pictured in Haab's *Atlas* (26), that is valuable on account of the detailed pathological examination, and is of clinical importance for us.

A woman was struck on the left eye by a rack on a wagon. There were various injuries of the anterior segment of the eye and the following condition was found in the fundus. The disc had rather blurred margins. It is surrounded by

a light ring from which two white tracts slightly divergent extended downward nearly to the equator. The retinal vessels ran beneath these elevated strands. Only below the disc did one large vessel, greatly curved, run above the prominent white elevation.

All the other cases of this sort that I found in the literature exhibited the characteristics of typical retinitis proliferans in a more or less marked degree.

Our second case (Mrs. Lichtle) doubtless belongs in the same category.

The difference between these cases and the cases of typical retinitis pigmentosa, notwithstanding the clinical variations of the latter, lies in the progressiveness of the latter, while the former are more stationary. The peculiar features of the former cases—the striated character of the deposits, the slight elevation, and the lack in some cases of a connection between the connective-tissue formations and the disc—do not seem to depend upon a fundamental difference from retinitis proliferans. For there are transition forms between the striated formation in the cases of Jakobi, Berger, and Banholzer and the plaques of greater lateral extent and sometimes triangular form that were observed in the cases of Schleich, Purtscher, and our own.

The second point, the difference in height, is variable and does not particularly distinguish the two.

In regard to the third point, Purtscher (58, p. 43) speaks as follows: "A further constant condition in all cases is, as Manz stated, the close relation between the arrangement and extension of the connective-tissue formations and the disc and vascular supply of the retina. Either we find the disc partly or wholly covered by the membrane, or the disc is immediately surrounded by the connective-tissue masses, or the connective-tissue tracts lie in the periphery of the fundus but always follow the course of the larger vessels. And even in these rarer cases the disc remains the anatomical centre and is connected with the denser connective-tissue masses by veil-like, membranous, or striated connective-tissue masses which accompany the larger vessels toward the disc. In other rare cases tracts of connective-tissue pass-

from the temporal margin of the retina to the macula, which usually remains free from the typical changes."

In Banholzer's case, the arrangement of the membranes about the disc which appears as in a hole, and in Berger's and Schleich's cases the connection with the margin of the disc is evident, but in Jakobi's, Purtscher's, and our own case this is wanting, for the white sheath about the veins cannot be followed from the connective-tissue mass to the disc. However, one may remember a fact in Banholzer's anatomical examination, according to which some connective-tissue may be demonstrated with the microscope which cannot be seen with the ophthalmoscope.

In respect of the etiology, Jakobi gives no clew. Berger, taking into consideration the completely preserved vision, supposes the affection to be a neuroretinitis of early infancy when the tissues have a greater capacity for regeneration. In the other cases the new formations are referred to hemorrhages, and in our case the clinical history shows a connection between the new connective tissue and the previous hemorrhages. I shall not discuss the nature of this connection since this has been done in great detail in the papers by Banholzer, Purtscher, and Fünfstück (18).

The second group according to Praun contains all the cases of white lines or tracts along the vessels, caused by inflammation or sclerosis of the vessel wall. The ophthalmoscopic picture produced by thickening of the vessel wall may differ greatly, ranging from white lines along the blood column to a complete transformation of the vessel into a white cord. Nor are these cases of uniform etiology. Even under physiological conditions, according to Mauthner (44, p. 321), one may find white lines along the vessels on the disc and near it, while this condition farther out in the retina usually indicates changes in the vessel wall itself. Such changes may be of secondary nature, following all sorts of retinitis (Mauthner, p. 320), or they may be almost exclusively in the vessel walls. The most marked cases of this sort, in which the vessels are replaced by white cords, have been seen a number of times.

Nagel (46) found in a healthy young man with a good

heart nearly all the arterial branches in both eyes, from their emergence in the disc to their finest branches, represented by white lines, partly sharply outlined and lustrous, partly dull and blurred. The broadest lines exhibited a bright-red line in the centre and only a few small arteries were normal. Some of the peripheric venous branches were transformed into white lines. The disc was covered by a whitish translucent prominent mass with new-formed vessels. In the fundus were some ecchymoses. Nagel regarded this case as a representative of some retinal affections, and designated it as a chronic inflammatory, slowly progressive process beginning in the walls of the vessels as a proliferation of connective tissue or a sclerosis, extending to the connective-tissue portions of the parenchyma of the retina, and from the arteries passing over through the capillary system to the veins. He sees in it an analogy to similar affections of the central organs that begin with a proliferation of nuclei and cells in the adventitial layer of the vessels.

Wedl (77) described a similar case in which the main branches of the central artery were chalky white, and Iwanoff (34) found proliferation of nuclei in the adventitia about the vessel on all sides.

In Jaeger's *Atlas* (32) three cases (Figs. 50, 51, and 75) are pictured and described, in which the vessels are narrowed and in part are interrupted by white stripes. In Fig. 75 there are found yellowish figures composed of ribbon-like stripes in the macular region, but independent of the vessels. There are no particular etiological factors mentioned.

Next to these cases came those in which the vessels have white sheaths, or portions of the vessels are transformed into white stripes, as were observed in the cases previously mentioned of thrombosis of the retinal vessels, the formation of the stripes and the thrombosis either being due to a common cause—an inflammation or sclerosis of the vessel wall or the stripes being caused by the obliteration of the vessels by the thrombus.

While in the cases already described the white tracts followed the course of the vessels, or were in direct connection with them, we find in the third group a series of changes in

which the striæ both in direction and in location in the layers of the retina are more or less independent of the vessels. A division was suggested by Praun (56) of these retrovascular striæ into (1) retinitis striata after inflammation, the striæ consisting of new-formed connective tissue between choroid and retina or in the retina alone, and (2) retinal striæ after detachment, the striæ here arising from absorption of the retinal pigment or from a deposition of fibrin between the unchanged retina and choroid. I do not coincide with this view, because Praun himself must admit that actual formation of cicatricial striæ may follow detachment, and further because the etiology is not so clear in all cases that a classification from an etiological point of view is not yet possible.

In taking up the question as to the relation between detachment of the retina and the formation of striæ, we find that considerable study has been devoted to this subject, particularly in recent years.

Even in 1859, Liebreich (39) established this relation. In discussing the color of the detachment and its dependence upon the nature of the liquid, he said: "The best insight into the relations is obtained by the study of cases in which the contents of the sac are not homogeneous but consist in part of clear liquid, in part of opaque coagulæ." He adds: "The coagulæ remain when the retina, after the disappearance of the liquid, becomes attached again, and they form bluish-white stripes between the retina and choroid and at times extend over a great portion of the retina and thus furnish a clew to the pre-existing condition."

These statements were later confirmed by various authors. Onisi (51) says: "There is no doubt but that after detachment of the retina light stripes are found which are of different origins and sometimes resemble the striæ of retinitis striata. But on the other hand it was impossible in our observations to refer the striæ in all cases to previous detachments. Since in many cases both striæ and detachments existed in the same eye, it is quite possible that both are dependent upon a common basic affection. But it is not true that in the cases we observed the striæ were

found first in the detached or reattached portion of the retina."

Purtscher (59), in 1891, published a case of spontaneous recovery from detachment which I mention because of the curious pigmented lines that were found, although the author does not take up the question of the origin of retinal striæ. He says: "The retina is everywhere reattached. At the points where it was detached there are extensive pigment changes, partly in the form of large points and spots, but mostly in the form of dark wavy lines radiating from the disc upward and outward. The retinal vessels pass unchanged above the pigment deposits and seem to stand in no relation to them." [The rare, but well-known angioid stripes, resulting from retinal hemorrhage. H. K.]

Müglich (45), in his dissertation in 1891, collected numerous cases of spontaneous recovery from detachment, and called attention to the formation of white stripes in the fundus. "A very frequent finding after recovery from retinal detachment consists of the so-called retinal strands. These are lustrous bright white or pale yellowish-white striæ of a breadth varying from that of a fine line up to several times the width of a retinal vein. At times they are found at the boundary line of the healthy portion, and are bordered by pigment masses of different sizes."

Caspar (10), in 1895, took up the question anew after observing in three cases of detachment the transformation of subretinal fibrous coagulæ into typical retinal striæ, and believed himself justified in assuming that the so-called retinal striæ are nothing else than a rare terminal stage of retinal detachment. He believed that there was no occasion to speak of a particular chorio-retinitis striata.

He described his first case as follows: "Above the macula which was included in the detachment, one saw a bluish-white stripe extending upward and outward beneath the retina. Two weeks later, when the retina had partly returned to its place, one saw in the formerly detached part issuing from the disc a mass of darkly pigmented, broad, short stripes, without sharply defined margins, all extending nearly in a horizontal direction. Some sharply outlined,

branched pigment stripes extended to the region outward and above the macula. Among the latter were three long, sharply outlined, gleaming white stripes, in part branched and bordered with pigment, which ran almost radially toward the disc but did not quite reach it. Their breadth was considerably more than that of the largest retinal veins. In the largest of these stripes one could recognize definitely the line which two weeks before had been seen shining through the detached retina. The stripes stood in no relation to the blood-vessels. They lay, furthermore, in the plane of the retina."

In the second and third cases pigment stripes passed out in opposite directions from the disc, growing broader and either running a straight course or, as in the second case, being curved like the tail of a comet. The stripes included a light streak in their middle and divided the retina into an upper normal and a lower pathologically altered half. In the latter were found white stripes independent of the pigment figure. One of them could be followed from the attached into the detached portion of the retina.

Similar to these cases is that of Natanson's (47) described in 1896. He describes a case of typical retinitis striata, with the following characteristics: (1) The presence of long, narrow, white striæ; (2) the formation of broad, pigmented bands, which begin near the disc, and, following a course like that of a comet's tail, extend to the extreme periphery of the fundus, separating the fundus into two portions, one of normal appearance, the other abnormal and containing the white stripes.

Since in Natanson's case no detachment was observed and the history indicated no such occurrence, I do not consider Natanson's view justified when he accepts the opinion of Caspar, that the ophthalmoscopic picture of chorio-retinitis striata is due to the reattachment of a detached retina. On the contrary, it appears to me that since the white stripes in Caspar's case were visible before the retina became reattached, and that in the second case the stripes extend from the detached into the normal portion of the retina, Onisi's view, that both detachment and the de-

velopment of striæ are of common etiology, is the more probable.

Praun (56), in the publication of 1895, already mentioned, described a case of detachment, in which at the margin of a prominent fold there was a pigment border. After puncture of the retina and evacuation of the subretinal liquid there appeared, after complete reattachment of the retina, a horizontal stripe under the black pigmented margin, and this ran horizontally through the entire fundus and was interrupted at some points by pigment depositions above it. By it the fundus was divided into two halves pathologically different. The picture recalls the characterization of chorio-retinitis striata by Natanson, differing from it in that the stripe passed 1 *p. d.* beneath the disc, and in that the upper half of the fundus remained free from pathological changes. But exactly these facts seem to show that the clinical picture of chorio-retinitis striata is not so definite but that one must recognize transition and less sharply characterized forms in respect of pigmentation and the formation of striæ. To the latter seem to belong Caspar's first case and Purtscher's case, which latter, despite the etiological accord, in its ophthalmoscopic picture differs from the requirements of Natanson.

In summing up we come to the conclusion that retinal stripes may well be the final stage of a retinal detachment, yet need not have this origin in all cases, nor even in cases in which at the same time detachment of the retina and the formation of striæ are found, for the latter need not be the result of the former, but perhaps the result of a common cause, as Onisi has already suggested.

The recent cases of striæ retinæ have been collected by Görlitz (23), who distinguishes two forms which can hardly be regarded as identical. The first is characterized by dark stripes with a grayish to grayish-brown color, often bordered by lighter stripes, and mostly extending in a radial direction from the disc toward the periphery. In this category come the cases reported by Plange (55), Holden (30), Walser (75), Pretori (57), and Dunn (14), which appear clinically to be a distinct group, since the changes usually occur simultaneously

in both eyes and usually leave the acuteness of vision normal.

In Plange's (55) case there were striated formations of dull brown color, arising from a layer of opaque, grayish-white, lustrous tissue about the disc and extending toward the periphery in a radial direction. At first they were two to three times as broad as a central vessel, but gradually they grew narrower and broke up in the periphery into small plaques and stipplings of the same color. The brown striæ were bordered by broader light stripes which centrally passed over into a large zone surrounding the disc.

In Holden's (30) first case there radiated from a cloudy zone about the disc a system of branched dark-brown stripes, composed of fine dots, and having the width of a papillary vein. In the right eye some of these stripes were in places bordered by light stripes twice as broad.

Walser (75) described two similar cases. In one radial striæ extend to the periphery from a gray ring surrounding the disc and half a *p. d.* distant from it. Their course is similar to that of an irregularly tortuous vessel. Some divide dichotomously, and others give off twigs which running concentrically with the disc give off twigs anastomosing with the neighboring striæ. The second case is similar. The gray zone has a notched margin and is partly surrounded by white. Furthermore a small artery is bordered by white lines.

In Pretori's (57) case there was a dark ring about the disc and half a *p. d.* from it, from which dark stripes of brownish, slightly violet color ran to the extreme periphery, branching irregularly and anastomosing frequently with one another.

The case reported by Dunn (14) was characterized by more or less sharply outlined stripes of varying breadth and length, which in the neighborhood of the disc are intimately connected and then extend toward the periphery. These are broader near the disc than in the periphery.

All these striæ run beneath the vessels, crossing them in such a manner that their independence of the vessels is manifest.

The second group, according to Görlitz, is characterized

by gleaming white, sharply limited narrow striæ, often bordered by lines of pigment. These striæ mostly run obliquely across the fundus, or in case these run toward the disc they include a certain portion of the fundus, leaving the rest fairly free. Clinically these cases are distinguished by being limited usually ot one eye and by a diminution of vision. Görlitz includes in this class the case of Jaeger (32), that of Caspar (10), and that of Praun (56). The cases of Jaeger (Figs. 73, 74), which I have not alluded to before, are fully described by Onisi, and I believe also that most of the other cases collected by Onisi under the name retinitis striata and the three last cases described by Holden (30) as well, belong to this class.

The characteristic features of this class may perhaps be extended so that, besides the white color of the striæ, their sharp outlines, and their frequent borders of pigment, we may add that the striæ consist of continuous elements running in a parallel direction, and often frayed out in the periphery. While the bands of the first group, when carefully examined, are seen to consist of numerous, individual points, they do not have a regular course, do not grow narrower in the periphery as the others do, but broaden out and end in grayish-white, more or less pigmented foci, and also in their course here and there pass into broadened white or pigmented foci, and often at such points exhibit a slight difference in level. The vessels all run anteriorly to these striæ, sometimes bending over them, so that from the parallactic displacement one recognizes that at such points they are raised above the ordinary level.

In discussing the etiology of all these formations one might assume from the similarity of the cases in the first group that the etiology was the same in all. Yet the writers hold quite different views on the subject.

According to Plange (55), the striated pigment deposits in the retina are the result of hemorrhages which lead secondarily to a hyperplasia of Müller's supporting fibres. The development from hemorrhages could be clearly followed, since, unlike the intense hemorrhages in the macular region which led to irregular piling up of pigment and

partial destruction of the pigment epithelium, at the points where the hemorrhages were less intense and did not recur at exactly the same places, pigment deposits remained after each hemorrhage, and interlacing gave rise to the brown stripes. The location of these striæ must, because of the intact condition of the pigment epithelium and of the rod-and-cone layer (as shown by the normal vision), be anterior to the outer layers and posterior to the vessels—*i. e.*, in the middle layers of the retina. The grayish-white portions in which dark stripes lie are of later development and, according to Plange, due to secondary changes, possibly hyperplasia of Müller's fibres.

Holden (30) also observed the development of these stripes from hemorrhages. In one large hemorrhage that, in the course of weeks, began to clear up from below, a brown Y-shaped stripe gradually developed in connection with the upper margin of the hemorrhage.

Dunn (14) first suggested that from the appearance at certain places one might suppose that the process was an inflammatory one, "severe enough to leave the straight direction and leave behind it small hemorrhages." Then, when his case remained unchanged throughout the period of observation and gave no support to this idea of its origin, he rather accepted the view of Plange, leaving the question open why the hemorrhages assumed so strange a form, from what vessels they came, and why they were limited to the outer layers of the retina.

Walser (75) offers three possibilities by which the condition might arise.

First, it might be retinitis, for which would speak the spots in the periphery, the points which might be regarded as colloid excrescences, and the collections of small masses of pigment. But in order to explain the formation of the striæ one must assume either a limitation of the retinitis to the parts later occupied by the striæ, or a diffuse retinitis, particularly intense at the places where the striæ develop. The rôle of the lymph vessels radiating from the disc, as described by Schwalbe and His (69), is not accorded much consideration by Walser since the existence of these vessels is denied by many.

The second possibility is that the striæ develop from hemorrhages occurring before birth or in early infancy, which, instead of disappearing, as they usually do, for unknown reasons remain. A hemorrhage, in the sense of Plange, is to be excluded on account of the grayer tone and stationary condition in these cases, while in Plange's case there was an actual brown color, and the process continued to develop over a period of years.

The third possibility depends upon the fact that Gowers (24) observed in neuritis concentric folds, and when the swelling was intense also radial folds in the outer layers of the retina. In the region of the folds there might be a proliferation of pigment, and an inflammation of the retina here might cause an opacity of the deeper layers. Where the inflammation extended beyond the pigment stripes it would explain the white borders of the latter. The concentric course of the pigmented striæ and the diminution in breadth of the radial striæ toward the periphery would agree with the character of the folds.

Pretori (57), however, believes that the condition may be a congenital one.

And for the second group also an explanation is extremely difficult. The great variations in direction and form which these striæ, unlike those of the first group, show, leads readily to different explanations. Holden (30) believes that for these also hemorrhages might be regarded as the cause, and he says: "Both the so-called retinitis striata and also the other variety with the brown spots arise possibly from striated peripheric hemorrhages in the deep layers of retina through different metamorphoses which these hemorrhages undergo . . . for we know that the final result of retinal hemorrhages may be either spots of light color or of pigment." It is recognized, however, that no transition forms are found between the two varieties; and furthermore that there is not only a difference in color but also in the distribution of the pigment — numerous small points of pigment arranged regularly in a line on the one side, and marginal, irregularly heaped up, and irregularly distributed pigment on the other hand. The frequent evident plastic

character of the white striæ suggests their development from the organization and substitution of some formations (exudations, coagula) by connective tissue. It must still be an open question, however, to what degree these are primary inflammatory processes, to what degree there is detachment of the retina, what is the location of the striæ in the retina, and what part the choroid plays in their production, because of the difficulty of determining these things with the ophthalmoscope and the lack of pathological reports.

If after considering the cases described in the literature we now return to our own we find that the second case belongs to the group of prevascular formations designated as striped retinitis proliferans. The classification of the first case offers great difficulties, for here the characteristics of the two groups are combined. The fundus exhibits places in which the prevascular location of the striæ is unquestionable, and other places in which the striæ clearly lie beneath the vessels and appear to run through the fundus quite independent of the vessels. Furthermore, in the case of most of the striæ there is a connection with the disc or with the cloudy zone surrounding the disc, while other striæ first make their appearance in the peripheric course of the vessels. When we recall that the classification of those cases on which this paper is founded depends more or less upon external characteristics, and that we are unable to classify sharply defined clinical pictures on a genetic or etiological ground, it is not surprising that there should be transition forms between the two groups, and it seems desirable to regard the ophthalmoscopic picture in our case as representing one of these transition forms.

In conclusion, the further question arises, What relations exist between the formation of striæ and the tortuousness of the vessels in our cases?

In the second case we are justified in regarding the tortuousness of the vessels as secondary, for in the first place the course of the affection showed that at the beginning of the stasis in the fundus the veins were but slightly tortuous, but later, when the connective-tissue deposits formed, the tortuousness reached the grade shown in the drawing (Fig. 2).

From this it appears that the blood current was interrupted by the connective-tissue deposits and by the changes in the venous walls so that tortuousness resulted. Such vascular anomalies are characteristic of retinitis proliferans.

The conditions were different in our first case (Fig. 1). Here no direct connection between the two anomalies was evident. Onisi (51) says of retinitis striata: "The retinal vessels in general exhibit few characteristic changes except an occasional well-marked tortuousness of peripheric venous twigs." In some instances, however, the tortuousness seems to stand in close relation with the formation of striæ, since (p. 15) "at the places in which the striæ end in white spots the overlying vessels curve over them, indicating that the stripes must have a considerable thickness"; and (p. 17) "in the periphery at the places where the white striæ end there are considerable differences in level and tortuousness of the vessels."

The fundus in our case, however, did not present such conditions. In the regions where the number of striæ was greatest the vessels were often but slightly if at all tortuous, and on the other hand tortuousness existed in areas where there was no sign of striæ.

Nor in our case could one find the connection which exists in thrombosis of the retinal veins between the white bordered or obliterated vessels on the one hand and the anastomoses and tortuousness on the other, as was clearly shown in the cases reported by Scheffels, Axenfeld, Elschnig, and Eversbusch.

The absence of a pathological connection between the vascular anomaly and the formation of striæ, and further the absence of an etiological factor for both anomalies, justifies the assumption that both changes were of congenital origin.

My thanks are due to Professor Manz and Professor Baas for permitting me to make use of these cases and for friendly advice in regard to the study of them.

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THE ANTISEPTIC TATTOOING OF THE CORNEA.

By Dr. L. DE WECKER, Paris.

Translated from *Arch. f. Augenheilk*, xxxix., 4, August, 1899, by Dr. Ward A. Holden.

THE paper by Dr. von Sicherer in the *Archiv für Augenheilkunde*, xxxiv., p. 22, on the sterilization of Chinese India ink for tattooing the cornea, rightly calls attention to the fact that the operation causes the greater irritation when the ink used is not sterilized and is of inferior manufacture, containing a greater number of capsule bacilli.

Von Sicherer says: "The genuine ink contains fewer bacilli than the imitation, and the finer sorts fewer bacilli than the cheaper." My observations agree wholly with this statement.

In 1869 when I began to tattoo opacities of the cornea the army surgeon, Weber, visited my clinic. He had been in the Chinese campaign and said to me: "If you wish an ink for tattooing, I can give you a stick that must be the best ink one can obtain, for I took it with my own hands from the Emperor's writing table when the Summer Palace was looted." With this imperial ink I began my tattooing, and Pornier in the first report in the *Union méd.* in 1870 stated that no evidences of irritation were observed. For years I have used this ink without seeing any inflammation arise.

But it is only too well known that inflammation may arise when the ink contains bacilli and particularly when the instruments used are not properly sterilized. I know of one case. A lady on her wedding journey brought her husband to a colleague, who advised that a macula of the cornea be tattooed. This was done and panophthalmitis resulted.

Thanks to the efforts of an influential physician no legal proceeding followed.

Trousseau in the *Annals d'oculistique*, March, 1899, reported a very sad case of destruction of the eye from iridocyclitis, with blindness of the other eye from sympathetic ophthalmia. In this case an adherent leucoma was tattooed, which I have always regarded as dangerous. At the same time he spoke of severe inflammation after tattooing what he remembered as a simple leucoma.

All the bad results hitherto published were in cases of adherent leucoma with thinned scars, in which the entrance of septic material is made possible, and also the anterior chamber may be opened to infection from injurious elements in the conjunctival sac.

Since my Parisian colleague reported his cases not without the intent to injure the operation, for he adds to the report the disconnected statement, "I am persuaded that one has greatly exaggerated the cosmetic and optical effects of the procedure," I permitted myself, as the introducer of the operation, to reply (*Annals d'ocul.*, Apr., 1899): "Early in my career I learned of the fatal result of a chalazion operation. The patient, operated on by Velpeau, succumbed to an erysipelas. Since then I have been called in consultation in a case of suppuration of the entire cornea in consequence of purulent ophthalmia, arising twelve hours after the extirpation of a chalazion. In another case both eyes were lost from infection with contaminated instruments with which chalazia had been removed from each eye.

"Were I to take the trouble I might collect numerous observations of this sort, but even if in secret I cherished that desire, I would not succeed in diminishing the number of the daily extirpations of chalazion. Very likely, the same would be the case if the matter under discussion was tattooing."

We should thank von Sicherer for advising that Chinese ink as pure and fine as possible be used and that it should be sterilized before use. For years I have used a 1:2000 solution of bichloride for that purpose, and lately I have placed the paste of India ink in a hot-air sterilizer before using.

Perhaps nowhere is tattooing so much done as in my clinic, yet I repeat, as I said thirty years ago, that aseptic tattooing is entirely without danger. But in order to avoid a possible infection the number of instruments used must be as few as possible.

We use only a broad needle, which is dipped in the paste. The disinfected lids of the well cocainized eye are held apart with the thumb and index finger of the left hand, thus steadying the ball. The patient will then hold the eye stiller than when a lid holder and a fixation forceps are used. At the same time the freely movable lid serves excellently to wipe off the superfluous ink from the cornea and thus to permit one to see how much he has tattooed and how much remains to be done. When one does the operation for optical purposes it is absolutely necessary that a speculum be not used, and the lids left freely movable.

I assert again, as our Russian colleagues also have done, that the value of tattooing for optical purposes is not yet sufficiently appreciated, when one abstains from adding by the operation new opacities about the original corneal macula. As I am accustomed to say to my pupils, "We are, in respect of the tattooing operation, *encore dans l'enfance de cet art.*"

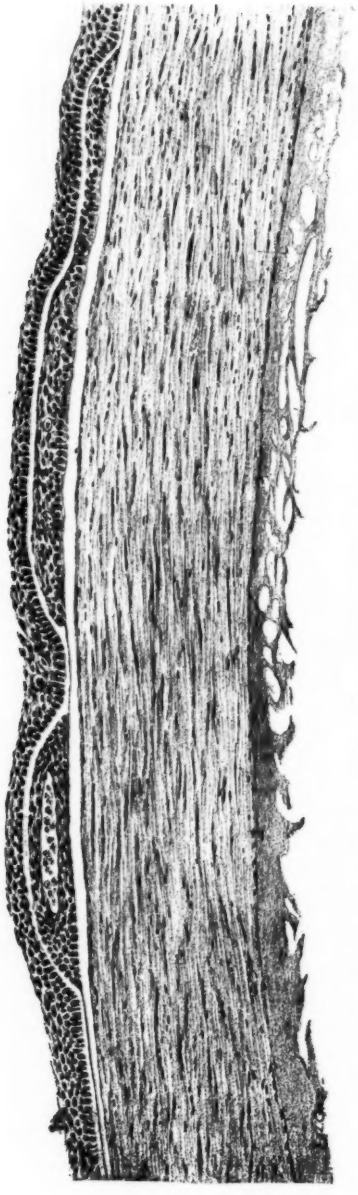

FIG. 1.—Keratitis bullosa. Peripheral section, showing membranous formation on the surface, detached from Bowman's membrane and forming arches through the thickened epithelium.

ON THE HISTOLOGY OF BULLOUS KERATITIS IN GLAUCOMATOUS EYES.

By G. E. de SCHWEINITZ, A.M., M.D., and E. A. SHUMWAY, M.D., of Philadelphia.

(*With Text-plates V. and VI.*)

[From the William Pepper Laboratory of Clinical Medicine, Phœbe A. Hearst Foundation.]

ALTHOUGH the subject of bullous keratitis as it occurs in eyes the subject of iridocyclitis, interstitial keratitis and glaucoma has received much attention, the pathological histology of this condition is not definitely settled, and hence the report of the examination of two eyes thus affected is not unworthy of record.

Case I.—M. B., a widow, aged seventy, a patient in the Hospital of the University of Pennsylvania.

Clinical History.—The patient presented herself for treatment on the 24th of October, 1901, with the statement that on the previous night pain had begun in the left eye, very severe in nature, which was followed by rapid deterioration of vision. She had used convex reading glasses for more than twenty years and convex glasses for constant wear for five years, and during this period had been much worried by inflamed eyes, lachrymation, photophobia, and conjunctival injection, for which she had from time to time received treatment from competent ophthalmic surgeons.

The vision of the right eye was $\frac{6}{12}$. With + 4 D., 0. 75 was read at 23 *cm.* The cornea was slightly hazy, the conjunctiva injected, the optic disc round and contained a small cup. The field for white was normal. The vision of the left eye was $\frac{6}{60}$ and was unimproved by glasses. The cornea was exceedingly hazy and

needle-stuck, the pupil semi-dilated and fixed, the fundus could be indistinctly seen, and a large glaucomatous excavation was visible in the nerve-head. The patient continued to attend the Eye Dispensary, and under treatment the glaucomatous symptoms which had been manifest in the right eye disappeared, but those in the left eye continued. Operation was not performed.

When Dr. de Schweinitz took charge of the service, in September, 1902, or nearly a year after she had first reported at the Eye Dispensary and six years after the first inflammatory signs had appeared in her eyes, she presented the following ocular conditions: O D, V = $\frac{6}{\frac{1}{2}\frac{2}{0}}$. With suitable convex spherical correcting glasses vision rose to $\frac{6}{7.5}$. The field of vision was normal in all respects, the cornea clear, the anterior chamber of proper depth, and the tension normal. The left eye presented the appearances of advanced glaucoma. Light perception was absent, tension + 3, the cornea exceedingly hazy, the iris dimly seen and atrophic in appearance, the sclera discolored, and the episcleral vessels coarsely injected. The lens could not be studied through the opaque cornea, the surface of which was roughened. In both eyes there were well-marked follicular granulations in the conjunctiva, very abundant in the lower retrotarsal folds, doubtless due to the the unintermittent use of eserin for nearly a year. At periods varying from a few days to a week the patient would return on account of pain, great lachrymation, and great increase in the bulbar injection, these attacks always being associated with the formation of a large bulla in the centre of the left cornea.

Enucleation was advised, and on the 9th of October, 1902, Dr. de Schweinitz removed the affected eye in the usual manner, with prompt relief of all symptoms. Up to the present time there has been no sign of renewal of the glaucomatous symptoms, which are recorded on the case books as having been present in the right eye when the patient first reported.

There are no facts of interest in the patient's general history. In vague terms she has sometimes been rheumatic, but physical examination failed to reveal organic lesion. The urine was normal, but there were some signs of atheroma of the blood-vessels, not more marked, however, than would be expected in a woman of her age.

Macroscopic Examination.—The central part of the cornea and the area directly below the centre is occupied by a single large

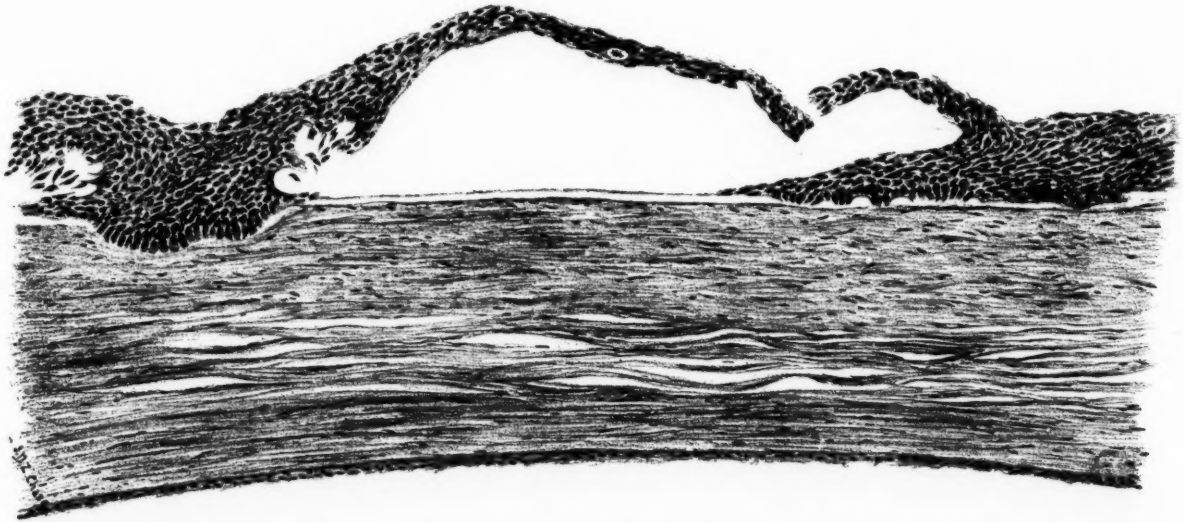

FIG. 2.—Bullous keratitis. The anterior wall of the bulla is composed of a thin layer of epithelial cells. At the left there has been superficial ulceration of the cornea and destruction of Bowman's membrane.

bulla. On cutting the eyeball in half, the lens was found in position, the anterior chamber shallow, the retina thinned, allowing the choroidal pigment to show through it, and the optic nerve cupped.

Microscopic Examination.—The bulla on the centre of the cornea measures 2.2 *mm* in diameter. In sections in celloidin it has collapsed and the thin walls are folded and project laterally beyond the point at which the epithelium is reattached. Its anterior wall is composed of epithelial cells alone, which show a moderate amount of change. The basal cells are polygonal in form, instead of cylindrical, as is the case with the normal foot cells of the corneal epithelium. Those of the succeeding layers are swollen and frequently exhibit fine vacuoles surrounding the nuclei. The nuclei are distorted, displaced to one side, and show beginning fragmentation, particularly on the surface. In the centre of the bulla the number of layers is greatly increased. Laterally, however, the epithelium regains its normal thickness, although this is very variable, and the surface is made quite irregular by the removal of the superficial cells over numerous small areas. At the point of attachment the basement cells become cylindrical in form, and continue so to the periphery of the cornea. The intercellular spaces are widened, here and there broadening into vacuoles, which contain coagulated fluid and an occasional leucocyte. Towards the limbus the epithelium is separated from Bowman's membrane by many round cells, in which are imbedded a few vascular twigs—*i. e.*, pannus tissue. The episcleral tissue is œdematous and infiltrated.

Extending from the extreme periphery, between Bowman's membrane and the epithelium, is a membrane varying from 7 to 9 μ in thickness, which has a homogeneous appearance, except in places where it has been forced away from its adhesion to Bowman's membrane. Here it shows a distinct fibrillar structure, as it arches upward through the epithelial cells. It does not reach as far as the central bulla, and takes no part whatever in the formation of its wall. In sections cut some distance above the centre of the cornea, where the bulla does not appear, this membrane is present throughout the entire width of the cornea, and, as the drawing shows (Fig. 1), is in many places separated from Bowman's membrane by layers of epithelial cells, through which it forms distinct arches, the largest of which measures from 0.5 to 1.25 *mm* in diameter. In sections treated with Van Gieson

solution it stains a pinkish red color, brighter than that of the corneal lamellæ, and its fibrillar appearance is more apparent. Its peripheral terminations are continuous with fine fibrils of connective tissue passing out into the subconjunctival tissue beyond the limbus. The membrane evidently represents a condensed layer of connective tissue, originating at the limbus in the pannus tissue, and spreading inward toward the centre of the cornea.

Bowman's membrane is present undisturbed throughout all of the sections examined. The nerve canals which cross it as fine, dark lines, which are scarcely perceptible in the normal eye, are here unusually broad. The substantia propria is of normal width, and shows no decided signs of œdema. The endothelium on Descemet's membrane is considerably altered. The cells are flattened and are much farther apart than in the normal eye, spaces the width of two cells intervening in places between adjoining cells, especially in the periphery of the cornea. The posterior surface of the cornea is covered with a layer of coagulated fluid which fills up the space between the iris and the cornea, in the angle of the anterior chamber.

The iris is adherent to the cornea for a distance of about 1 *mm* in front of the opening of the canal of Schlemm, so that the filtration angle is closed all around. The iris is atrophic, and its fine stroma is replaced by thick, interlacing meshes of connective tissue, which surround and compress the thickened blood-vessels. There is an increased amount of pigment imbedded in the stroma in the form of irregular clumps.

The ciliary bodies show an atrophy of the muscular tissue and conversion of the vascular processes into solid cords of connective tissue, which has undergone hyaline change and contains a deposit of lime salts.

The lens is in position, and is normal in appearance.

The retina shows cystic cavities in its anterior portion. The membrane is much thinned, the ganglion cells have almost entirely disappeared, a few distorted cells with retracted processes alone remaining. Mueller's fibres are prominent and are spaced apart. The cells in the nuclear layer are thinned out; the rods and cones are also fewer in number than normal, their outer ends are degenerated, and the individuals tend to form in irregular tufts, between which small cavities are evident as the indication of a previously existing œdema. The retina is everywhere adherent to the choroid, but there is no proliferation of the pigment

epithelium. Here and there the cells are raised in small projections, apparently by the presence of fine droplets in the cells, as described by Wedl and Bock in beginning colloid change in the retinal pigment cells. The vessels have very much thickened walls, a point well shown in sections stained by Van Giesen. They contain red-blood corpuscles, but show no thrombi. The optic-nerve head is excavated to the depth of 1 *mm.* The nerve tissue is atrophic and the intervaginal spaces are broadened.

Diagnosis.—Absolute glaucoma; bullous keratitis; degeneration of the retina; excavation and atrophy of the optic nerve.

Case 2.—W. V., a man aged fifty-four, consulted Dr. de Schweinitz on the 18th of May, 1895.

Clinical History.—Seven years prior to this visit, while chipping a piece of steel with a cold chisel, something struck his eye which gave him some temporary inconvenience but of which no great note was made, although almost from the first muscæ were observed before the injured eye. Two months later vision failed markedly, and he consulted a competent ophthalmic surgeon, who informed him that the failure of vision was due to glaucoma and advised immediate iridectomy, which was successfully performed. Pain and inflammatory reaction in the eye, which had been present prior to the operation, stopped, and although there seems to have been no restoration of vision the eye gave him no serious inconvenience. He came for advice because of attacks of vertigo and some pain and inconvenience after the use of his eye.

Examination revealed the following conditions: Vision of O D nil; upward iridectomy with well-placed pillars of the coloboma; at the corneo-scleral margin at the upper part of the coloboma a small cystoid cicatrix. With some difficulty the lens was made out to be entirely opaque and presenting the ordinary appearances of black cataract; tension slightly +. V of O D with + 1.25^{c} axis 150, $\frac{6}{6}$; media clear; pupil prompt; disc round; small physiological cup; surface of the papilla slightly congested. The field for form and red was absolutely normal.

Suitable glasses were prescribed and the patient was not again seen until the 4th of September, 1902, when he returned with the following history: One year previously the cataract of the right eye had been removed by a surgeon whom he consulted, but his statement as to the exact character of the operation was not very clear, and it may be that no attempt was made to remove the lens but that the cystoid cicatrix was incised, for it is difficult to

understand why any surgeon would remove the lens from an absolutely blind eye of this character. Be this as it may, since this operation pain had begun in the eye and he constantly was worried with the feeling of a foreign body. The eye, previously quiet, became congested, the cornea very hazy, and on numerous occasions bullæ formed on it which were manifest at the time of the examination. Vision of the left eye at this time with suitable glasses was $\frac{6}{6}$ —, the discovery pallid, and a beginning pathological cup was evident.

The right eye was enucleated on the 12th of September, 1902, by Dr. de Schweinitz, with immediate relief of pain and discomfort, and suitable glasses and a weak eserin solution were prescribed for the left eye. The visual field of this eye was uncontracted for form, but there was distinct limitation of the red field.

Macroscopic Examination.—On cutting the eyeball in a vertical plane passing through the cornea and optic nerve, a small foreign body was seen in the outer half of the eye imbedded in the retina and choroid, about 10 *mm* behind the ciliary body. On application of the magnet to this, small particles of rusted metal adhered to the point. The crystalline lens had disappeared, the iris showed a broad coloboma above, the retina was in place and thinned, and the optic nerve showed a shallow excavation. This half of the eyeball was mounted in glycerin jelly.

Microscopic Examination.—The other half was imbedded in celloidin, and the microscopic sections show the following lesions: The surface of the centre of the cornea is occupied by two bullæ, respectively 0.5 and 0.62 *mm* in diameter, situated in close proximity. Their walls are composed of epithelial cells alone, and, as is shown by the sketch (Fig. 2), a thickened layer of the epithelial cells forms the wall separating them. At this point Bowman's membrane is destroyed, so that the epithelial cells are attached to the substantia propria below the surface. There is a similar area of old ulceration above, in which Bowman's membrane has been destroyed and the corneal tissue replaced by scar tissue into which the thickened epithelium sends irregular processes. Elsewhere Bowman's membrane is intact, but is separated from the epithelium by numerous small spaces, filled with fluid and leucocytes and at the periphery by considerable pannus tissue. There is no connective tissue over its surface, as in the first case.

The walls of the bullæ are very thin, in places being composed of only two layers of cells. These cells show vacuolization

around the nuclei, and the basal cells are all squamous in type. Laterally from the bullæ the foot cells are separated by fine lines, and those of the superficial layers are swollen, and in many places have been lost or are being detached so that the surface is very irregular.

At the limbus the subconjunctival tissue is œdematous and the blood-vessels widely dilated, full of blood, and surrounded by a round-cell infiltrate. These capillaries extend a short distance into the corneal substance. The lamellæ of the substantia propria are very distorted and irregular and the corneal corpuscles stain poorly. The upper part of the cornea shows the position of the old iridectomy wound. Here Bowman's and Descemet's membranes are both interrupted, and the surface epithelium dips downward into the cornea.

The iris is well clear of the wound, but is adherent to the cornea at the periphery all around for a distance of one-half a millimetre anterior to the position of Schlemm's canal, so that the angle of the chamber is obliterated. The atrophic ciliary bodies are forced backward, and a beginning intercalary staphyloma is thus formed. The processes contain widely distended blood-vessels. The endothelial cells of Descemet's membrane are very irregular, as in Case 1, especially at the periphery of the cornea, where they are flattened, spaced apart, and allow stretches of Descemet's membrane to lie exposed.

The iris stroma is not much altered. There are a few mononuclear round cells in the tissue, and the surface is covered with a thin layer of organized fibrous tissue, which is still quite cellular. The cross-sections of two blood-vessels of considerable calibre, running horizontally, form conspicuous projections above its surface near the pupillary area. The ciliary muscle is very much atrophied, especially above, in the position of the coloboma. The pigment layers of both iris and ciliary processes are proliferated and show several large cysts, formed between the separating layers.

There is no trace of the crystalline lens, either of the cortical substance or of the capsule. The choroidal vessels are hyperæmic, but the choroid as a whole is thinned.

The retina is cystic anteriorly; posteriorly its ganglion cells have disappeared entirely. Mueller's fibres are hypertrophied and form rounded arches, where the individual bundles have been forced apart and cavities formed by collections of fluid. The rods and cones are irregularly curved in the same manner, and

show minute cavities. The retinal blood-vessels are full of blood corpuscles and exhibit thickened walls. The pigment epithelium is normal and the retina is not adherent to the choroid, being artificially detached above in the imbedding process. The nerve-head shows a shallow excavation, 0.4 *mm* deep, embracing the entire nerve. Both edges are overhanging and the nerve is atrophic.

The eyeball is enlarged in all its dimensions, and the sclera is thinned, especially in the equatorial region, but it shows no evidence of scleritis. Sections treated according to Perl's method show a slight staining of the cells of the ciliary region, but no decided iron reaction, such as is usually found after the presence of a particle of iron in the eye for so long a time.

Diagnosis.—Foreign body in the interior of the eye; iridocyclitis; secondary glaucoma; bullous keratitis with corneal ulceration; iridectomy upward; atrophy of the retina; excavation and atrophy of the optic nerve; beginning intercalary and scleral staphylomata; blood-vessel formation on the surface of the iris.

The two cases illustrate the two most frequent conditions of the eye in which bullous keratitis occurs, mainly, absolute glaucoma of the primary variety, and glaucoma secondary to an iridocyclitis, in this case traumatic in origin.

The subject of bulla formation on the cornea, as upon the skin in herpes and pemphigus, is still involved in considerable obscurity. The first case to be anatomically described was by Albrecht v. Graefe in 1853.[1] He found that the anterior wall of the bulla consisted of three layers—epithelium, Bowman's membrane, and a thin layer of superficial corneal substance. Schweigger,[2] however, and later Saemisch,[3] claimed that it consisted only of epithelium, and in the majority of cases this has been confirmed by other observers.

Fuchs was the first who was able to make sections of the entire eyeball on which bullæ were present, and reported his results before the Heidelberg Society in 1879.[4] He said that in two cases, in addition to the epithelium, the wall was formed by a layer of tissue composed of parallel and apparently homogeneous fibres, about $\frac{1}{10}$ *mm* in thickness, apparently originating in the connective tissue accompanying newly formed blood-vessels which run from the periphery

toward the bullæ, between Bowman's membrane and the epithelium. He thought that Von Graefe had made the mistake of confusing this layer of connective tissue with Bowman's membrane, which it closely resembles, as he had been able to study only the wall of the bulla after its removal from the cornea. In a subsquent paper Fuchs[5] states that in some cases this layer of tissue is the result of the coagulation of an albuminous fluid forced through Bowman's membrane, just as a similar layer of coagulated fluid is often found on the posterior surface of the cornea. Such a tissue had been described by Leber,[6] Arlt,[7] and others, as a fine connective-tissue layer, differing from pannus in the greater absence of blood-vessels, and hence the lesser liability to absorption, from the surface of which fine twigs extended upward between the spaces in the epithelium. Brügger[8] and Birnbacher and Czermak[9] also mention this layer but do not say that it entered into the formation of the bulla.

In our first case, in which it is present, it does not extend to the bulla in the centre of the cornea, and so takes no part whatever in the formation of its wall, and apparently represents a continuation of the connective tissue from the corneal periphery. If this tissue is present at the site of the bulla it may of course form part of its wall, but it has been thus described only in exceptional cases, and the greatest interest, therefore, centres in the epithelium which is usually alone represented.

Thickening of the epithelial layers and a granular condition of many of the cells was noted by Graefe,[1] but it is to Leber[6] that we owe the most elaborate study of the subject. He described in detail the clefts between the cells, vacuoles surrounding their nuclei, the minute spaces between the epithelium and Bowman's membrane enlarging into tiny vacuoles filled with coagulated fluid, which were often in direct connection with the widened nerve canals passing through Bowman's membrane, and finally, the separation of the corneal lamellæ and the flattening of the corneal corpuscles. These appearances were fully confirmed by Fuchs,[5] and form a picture which since then has been recognized as typical of œdema of the cornea due to increased intraocular

tension. Very marked changes in the epithelium have also been sketched by Hess,[10] Nuel,[11] and Brügger.[8]

Nuel believes that many of the vesicles are produced by the local degeneration of the cells, especially of the middle layers, by the continued irritation of the epithelium. Brügger thinks that as a result of the lymph stasis there is an over-nutrition and consequent overgrowth of the cells, which, however, are not viable and soon degenerate, loosening their connection with Bowman's membrane. Birnbacher and Czermak,[9] on the other hand, believe that the degeneration is due to a neuritis of the corneal nerves—in other words, that it is an akantholytic process, such as is described by Lesser in herpes zoster and by Ausspitz in pemphigus. Panas[12] also thinks that by irritation of the corneal nerves, as in zona, the deeper cells may be liquefied and form the fluid contents of the bulla. The condition of the epithelial cells is therefore an important element in the production of these corneal bullæ, and while our two cases do not show the marked changes and bizarre forms described by Hess and Nuel, they illustrate a point which has not been sufficiently emphasized as a factor in the recurrence of the bullæ—*i. e.*, the change in the form of the basal cells. The corneal epithelium is much less firmly attached to the surface than the skin epithelium, because of the absence of the papillæ. In the normal eye the foot cells are cylindrical in form, and their basal plates fit smoothly to the surface of Bowman's membrane. Where the epithelium has been detached, however, the cells lose their cylindrical form and become small and irregular, and consequently are less firmly attached to Bowman's membrane and more easily raised by fluid forced through it. This factor must enter also in the recurrence of the lesion in the curious cases of relapsing traumatic keratitis bullosa, or traumatic keratalgia, some of which have been reported recently by de Schweinitz.[13]

The question as to the origin of the increased fluid in the cornea in œdema due to glaucoma has also been much disputed. Leber[6] believed that it was a pure stasis of the lymph circulation, and proved experimentally that fluid could not be forced into the cornea from the interior of the

eye by increased intraocular tension, as Descemet's membrane and its endothelial cells were impermeable. In this opinion he is upheld by Birnbacher and Czermak[9] and others. Birnbacher and Czermak believe that the increased fluid is to be ascribed to an increased transudation from the capillaries of the corneal limbus. Fuchs,[8] however, contended that, while under normal circumstances the endothelial cells are impermeable to fluids, under the pathological conditions which give rise to œdema of the cornea, changes in the cells, such as the loss of some of them, or in their form, whereby the interstitial spaces become broader, might render possible the passage of fluid from the anterior chamber into the cornea. Such changes, in fact, have been demonstrated by Panas[13] and are well shown in both of our cases, the cells being flattened and in places separated from each other by decided intervals. Greeff[14] thinks that in addition to this method there is a possibility that the fluid may come also from the capillary network of the corneal limbus. This increased fluid, which cannot be drained off laterally because of the obstruction of the lymph channels, forces its way through the widened nerve canals in Bowman's membrane, or, as Brügger believed, through parts of the membrane weakened by absorption, produces an interepithelial œdema which causes the cells to degenerate and loosen their hold on Bowman's membrane, and raises the epithelium in the form of bullæ. The irritation of the corneal nerves may also be a factor in causing degeneration of the epithelial cells, and when the bulla formation has once occurred, the weakening of the connection between Bowman's membrane and the cells by the substitution of flattened, squamous cells for the high cylindrical, basal cells makes the recurrence of the bullæ an easy one. After rupture of the vesicle, infection of the cornea may take place, and ulceration of the surface may be followed by panophthalmitis and total destruction of the eyeball.

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A TEST FOR CENTRAL COLOR-PERCEPTION.[1]

By PERCY FRIDENBERG, M.D.,

VISITING OPHTHALMIC AND AURAL SURGEON, INFANTS' AND RANDALL'S ISLAND HOSPITALS, ETC.

(*With one text cut.*)

THE most commonly employed means of examining the macular color-sense and of testing for central scotoma—in fact the only one mentioned in most text-books of ophthalmology—is the perimetric method. To this particular purpose, however, the perimeter is not perfectly adapted, for in determining the limits of the visual field two factors are present which militate against accuracy in detecting small central or para-central defects. The first of these is the lack of control over the subject's fixation, and hence an inability on the part of the examiner to be sure that the macula alone has been concerned in the visual act. The patient is told to look at the mark on the centre of the revolving arc, but as the examiner is not in a line with the patient's gaze, a deviation of several degrees could take place without being noticed. Unless we have some means of compelling and insuring absolute fixation, we cannot with certainty detect, or, on the other hand, exclude beyond a doubt a small central color-scotoma. A further source of error lies in the fact that the test-object is brought in from a possibly quite normal periphery, so that the subject has learned the color of the target before it is presented for macular perception, and knows what he is expected to see.

[1] Presented at the Section on Ophthalmology, New York Academy of Medicine, Monday, January 18, 1903.

Both objections may be removed if we keep the subject in ignorance of the color of the test-object until it is presented for inspection with the macula, and, using small targets, expose them to view for a moment only while the point at which they are to appear is firmly fixed. Recognition by normal eyes is virtually instantaneous, and before a color-defective macula can be moved by aiming the eye anew and bringing another portion of the retina into action, the target has disappeared. Absolute fixation is assured by standing opposite to the patient with one's own line of vision meeting his, and bringing the test-object up to a point where it is fixed by both subject and examiner. The slightest deviation of the eye of the former will at once be detected, and the target is not exposed until this is remedied. In practice the test is applied as follows: The test-objects are small, about 4 *mm* square, cut out of variously colored paper or cardboard. These are held in the palm of the left hand, hidden from the patient's view. With a small forceps, held between the thumb and third finger of the right hand, one of these color-squares is picked up and the index finger extended over it so that it is still covered when the hand is held up before the patient, who is told to look sharply at the tip

FIG. I.

of the index finger. When convinced that fixation is absolute the target is exposed momentarily by flexing the finger and sliding it down along the forceps, returning it immediately to the first position, hiding the test-object. The latter can thus only have been seen by the macula as it occupied exactly the same position as the finger-tip which was being sharply fixed and was covered before any correct ing motion of the eye could be made. I desire now to present an instrument which embodies the same principle in a convenient and ready form. The color-carrier is much like an ophthalmoscope in general appearance, except that red, green, blue, yellow, and white color-discs take the place of lenses, and that there is, of course, no mirror. The front of the instrument (Fig. 1), which is to be presented to the patient, has an aperture 8 *mm* in diameter, which can be reduced by a sliding quadrant with openings 1, 2, 3, and 4 *mm* in diameter. The aperture is ordinarily covered by a shutter moving vertically in a spring-slide. The fixation point is marked by a white dot. Drawing down the slide uncovers the aperture, occupied by whichever color-disc has been rotated into position. When the slide is released, the shutter immediately springs back into its original position and again covers the aperture. The "exposure" may thus be made instantaneous, or if desired it may be indefinitely prolonged.

The color-carrier described above has, I believe, the merits of being ready, portable, accurate, and inexpensive. While claiming no originality for the test-method itself, my aim has been to increase its usefulness, and perhaps to call attention to its importance by putting it into a convenient instrument. The carrier is manufactured by E. B. Meyrowitz of this city, to whom I am indebted for the accompanying cut, and for the promptness and skill with which my suggestions were embodied in a practical form.

REPORT OF THE MEETINGS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

By Mr. C. DEVEREUX MARSHALL.

THURSDAY, JANUARY 29, 1903. W. LANG, F.R.C.S., PRESIDENT, IN THE CHAIR.

Messrs. A. Stanford Morton and J. Herbert Parsons read a paper upon **hyaline bodies** (Drusen-formation) **at the optic disc,** with drawings and notes of two cases and lantern slides.

Out of 42 cases in the literature 7 had retinitis pigmentosa, others were associated with injury, nervous disorders (from a simple headache to chronic hydrocephalus and insanity), and chronic interstitial nephritis, but a large number of patients were normal with normal vision. The condition usually commences in early life and is extremely chronic. In nearly all cases both eyes were affected, but often unequally. The prognosis is good. The pathological anatomy of the condition was discussed and various allied conditions demonstrated. It was shown that "Drusen" are not ordinary colloid bodies such as are found upon the choroid, though these too may occur near the disc. Exudates similar to the hyaline nodules may become metamorphosed into true bone such as is frequently seen in the choroid in shrunken globes. The fate of exudates in the disc and in other parts of the eye and their dependence upon environment were discussed.

Mr. J. Herbert Parsons read a paper upon **primary extradural tumors** of the optic nerve, with clinical and pathological notes of a case illustrated by lantern slides. There are 18 cases on record as compared with 102 cases of primary intradural cases.

The disease usually commences before the age of ten years and

the prominent symptom is exophthalmos, the protrusion being most marked in the axis of the orbit. The failure of vision is slow, slower than with intradural tumors, and is accompanied by optic neuritis of the "choked-disc" variety, to be followed by postneuritic atrophy. Later changes in the eye result from lagophthalmos. In no case was the globe invaded by the growth. Eight of the growths were undoubtedly endotheliomata, several having the characteristics of psammomata. The fibromatosis present in most cases is a feature of importance. The growths are slow and of relatively low malignancy, giving rise neither to glandular dissemination nor to metastasis. Considering this fact and that the point of danger is at the apex of the orbit, Krönlein's operation, with retention of the globe, is indicated wherever possible.

Dr. THOMAS SNOWBALL read a paper on the **formation of bone in the choroid.** Notes were given of a series of seven cases in which ossification had taken place in eyes that had become blind and shrunken as the result of old perforating injuries or long-standing inflammation with or without perforation. In the choroid a chronic inflammation with plastic exudation is set up, leading to degenerative changes in the various layers of this coat; the outer pigmented stroma becomes more or less fibrous, the inner layers, the chorio-capillaris and membrane of Bruch, are to a large extent replaced by fibrous tissue which has become organized from the exudation poured out towards the inner surface of the choroid. In this fibrous tissue, the bone has developed. At the areas of bone-formation, the chorio-capillaris when present is never a continuous layer, but is represented by only a few vessels here and there. The lamina vitrea, when seen near the focus of bone, was never found external to it. This is contrary to the observations of Brailey, Fontan, and others, who described cases where the membrane of Bruch was seen as a distinct line external to the plate of bone.

In most of his own cases the bone formed a layer in the usual situation, viz., around the optic-nerve entrance. In one case where colloid bodies were undergoing ossification, the bone in the choroid had evidently arisen independently of them and was in a more advanced stage of development.

In none of the cases was there a trace of sympathetic disease in the other eye.

From a study of his own cases and those described by Knapp,

Whiting, Lagrange, and many others, it was concluded that ossification in the choroid arises most commonly in fibrous tissue developing in the chorio-capillaris and either replacing it or lying immediately internal to it.

Mr. L. WERNER reported **two cases of tumor of the optic nerve, in one of which Krönlein's operation was performed with preservation of the eye.** He referred to another also under the care of Mr. Swanzy. The first was a woman aged forty-three. There had been a swelling of the inner canthus a year before she came under his observation. When seen the left eye was *2 cm* in advance of the right and the eye was pushed downwards. The eye was blind, there was no pulsation or bruit, and the optic nerve was atrophied. A tumor of the optic nerve was diagnosed and it was removed by Krönlein's operation. It did not involve the eye in front, but behind it entered the apex of the orbit and required removing piecemeal. On account of the unsatisfactory condition of the cornea the lids were temporarily united, but they were subsequently opened again. The eye assumed its normal position, though with some impairment of movement. The tumor enclosed in the dural sheath was an alveolar sarcoma, the cells being rather suggestive of its being an endothelioma.

The second was a girl aged eleven, whose eye had for fourteen months been prominent and divergent. The eye was removed with the growth and the inner aspect of the lid was scraped and the orbit cleared out. This turned out to be a myxosarcoma surrounding the nerve, which was entirely degenerated.

Krönlein first performed this operation in 1899. It is not difficult to do and has many advantages over any other. The risks are practically nil and of seventy consecutive cases only one had died. In cases of orbital tumor in which the nerve was not involved the sight might be preserved.

The following card specimens were shown:

Mr. L. WERNER: Coloboma of the optic nerve.

Mr. F. A. C. TYRRELL: Congenital malformation of the lower lid.

Major M. T. YARR: Changes in the macular region following contusion of the eye.

Mr. E. T. COLLINS: Case of favus of the upper eyelid.

Mr. HOLMES SPICER: Sections from nævus of the orbit.

Mr. H. J. FISHER: Aneurysmal dilatations of the retinal vessels in a boy suffering from heart disease.

FRIDAY, MARCH 13, 1903. W. LANG, F.R.C.S., PRESIDENT, IN THE CHAIR.

Mr. STEPHEN MAYOU read a paper on the **treatment of trachoma by the X-rays.** The idea first occurred to him when treating rodent ulcer and lupus of the eyelid where he saw that no serious damage to the globe occurred. The first case cured in this way was shown by him last June, and since then several others have been successfully treated.

The histological changes in living tissues exposed to the X-rays were described, the most important being the superficial irritation capable of being increased and accelerated by the simultaneous application of the irritants, such as sulphate of copper; most of the resulting leucocytosis is formed around the trachoma nodules and the cells of rodent ulcer after the X-ray treatment, the reason for this being that they similarly act as irritants.

It was next pointed out that with care the amount of reaction could be regulated, and that the varying degrees of reaction might be compared with the first three degrees of burns described by Dupuytren.

Cases of prolonged exposure of the globe to the X-rays were then instanced where the only bad effects produced, and these only temporarily, were falling out of the eyelashes and conjunctivitis; this latter trouble was also found amongst workers in the X-rays, and in them could be prevented by the use of lead-glass spectacles.

In experiments on rabbits and frogs Mr. Mayou found, with Fuchs and Kriedl, that there was no bleaching of the visual purple.

The results of treatment with the X-rays were then compared with those produced by sulphate of copper, jequirity, etc., and it was pointed out that there were less destruction and subsequent cicatrization as well as far less pain with the former treatment.

The technique of the treatment was next described. The lids were everted, the operator's hands being protected with bismuth ointment and cotton gloves; the cornea was only exposed in severe cases where pannus was present. Owing to the infiltration set up difficulty was found in deciding when treatment should cease. Out of 9 cases 5 remained well; 1 cleared up but recurred two months later, 2 others improved and were still under treatment, and in one case of corneal opacity following trachoma the vision improved from P. L. to fingers at three feet.

The advantages of the treatment were: 1. There was less resultant deformity of the lids. 2. It was painless. 3. Pannus cleared more thoroughly. The disadvantages were: 1. All patients did not react to X-rays. 2. It was difficult to say when treatment should cease.

Lantern slides and patients were shown.

Remarks were made by the President, Mr. CARGILL, and Mr. STEPHENSON; the last said he had seen the best results from the use of the high frequency current.

Anophthalmos and microphthalmos in a chick.

Messrs. TREACHER COLLINS and J. HERBERT PARSONS described the microscopical appearance of sections through the orbits of a chick, in which the right eye appeared to be congenitally absent and the left eye abnormally small. In the right orbit a ring of hyaline cartilage, like that of the sclerotic, was found enclosing partly pigmented tissue, similar to that of the choroid. There was no lens, retina, pigment epithelium, nor optic nerve—that is to say, there was a complete failure in development of all structures derived from neural epiblast.

The essential element of an eye is a nervous mechanism which serves to receive visual impressions for transmission to the brain. Where this mechanism is completely absent the condition may be accurately described as one of anophthalmos, notwithstanding the presence of some of the subsidiary structures developed from mesoblast.

So far as the writers have been able to ascertain, there is no case of congenital absence of the eye where it has been satisfactorily shown by microscopical examination that the mesoblastic structures were entirely absent.

On the left side the chick had a microphthalmic eye in which the lens had failed to become separated from the cornea. The capsule of the lens was adherent to the substantia propria of the cornea, Descemet's membrane having failed to develop. The adhesion had obstructed the growth of the iris forward; above, it had turned back and crept round the posterior surface of the lens; below, its growth had become arrested.

Injuries to the eye of the child during labor.

Drs. ERNEST THOMSON and LESLIE BUCHANAN communicated some of the clinical and pathological observations which they have made upon this subject. After indicating the scope of the work done in this connection, Dr. Ernest Thomson gave a résumé

of the lesions in the twelve cases observed. These comprised: expulsion of the eyeball, proptosis, injuries to the cornea, hemorrhages into various parts of the eye, and retroversion of the lens and vitreous body without rupture of the globe.

It was here pointed out that, owing to the limit of time, it was then proposed to devote special attention only to the most interesting points in the subject.

Dr. Leslie Buchanan then described in detail three cases of lesion of the cornea, namely: 1. Rupture of the posterior elastic lamina with involvement of corneal tissue (healing). 2. Rupture of the posterior elastic lamina and corneal tissue (unhealed). 3. Rupture of the posterior elastic lamina with abrasion. The points of similarity and difference were briefly explained. The identity of these cases of rupture of the posterior elastic lamina and corneal tissue with the cases already described as traumatic keratitis with linear opacity (*Trans. Ophth. Soc.*, vol. xxii.), from a clinical standpoint, was then pointed out, and the etiology of other corneal opacities seen at birth discussed.

Remark was made upon the very unusual injury, retroversion of the lens and vitreous body, and the nature and origin of the case somewhat fully explained. In conclusion the subject of traumatic exophthalmos was dealt with and allusion made to the connection between this and the localized indentation of the cranial bones due to pressure against the sacral promontory. The subject was illustrated by macroscopic and microscopic specimens and diagrams.

Mr. LAWFORD read notes of a case of complete dislocation of the eyeball forwards, occurring in a child aged seven, as the result of a fall against an iron fender.

Reduction was easily effected under chloroform, and recovery ensued with no defect of sight and no limitation of movements of the eyeball. Slight proptosis was noticeable for one month after the accident, but no restriction of ocular movements could be detected even three days after the reduction of the dislocation.

The following card specimens were shown:

1. Dr. LESLIE BUCHANAN: (*a*) Separation of the ciliary body. (*b*) Congenital mal-development of cornea and sclerotic.

2. Mr. STEPHEN MAYOU: Two drawings of normal fundi, illuminated by the mercury vapor lamp.

3. Mr. ARNOLD LAWSON: (*a*) Paralysis of cervical sympathetic. (*b*) Chronic irido-cyclitis, probably sympathetic.

4. Drs. W. E. THOMSON and LESLIE BUCHANAN: Preparations illustrating the effects of injuries to the eyes of a child during labor.

5. Mr. JESSOP: Tumor in macular region.

6. Messrs. SINCLAIR and PARSONS: Endothelioma of the cornea.

7. Mr. DOYNE: (*a*) Melanotic carcinoma of the upper lid. (*b*) Intraocular hemorrhage.

8. Mr. GOLDSMITH: Hole in macula.

9. Mr. HARMAN: Connective tissue veiling the disc.

REPORTS OF THE MEETINGS OF THE OPHTHALMOLOGICAL SECTION OF THE NEW YORK ACADEMY OF MEDICINE, HELD ON MONDAY EVENINGS, FEBRUARY 16 AND MARCH 16, 1903.

By Dr. HENRY H. TYSON, Secretary.

MEETING OF FEBRUARY 16TH. DR. A. DUANE, CHAIRMAN.

Dr. Weeks read a **report** of an **extraction of cataract** from an eye **after sympathetic ophthalmia.** He gave the following history: C. S., aged twenty-nine years, was seen on January 27, 1903. At the age of twelve he was injured in the left eye by the explosion of a firecracker. The eye became very much inflamed and the vision was reduced to perception of light. Five years after the injury the vision of the right eye began to fail. The patient passed under the care of an oculist, who diagnosed sympathetic ophthalmia and who treated the case vigorously, but vision became reduced to perception of light. Six years after loss of vision in the sympathizing eye an iridectomy was performed in the hope of improving the vision, but without success. St. Pr.—Right eye: Ocular and palpebral conjunctiva normal. Cornea clear in its upper two thirds. Slight opacity at both margins of the cornea just below the horizontal meridian, measuring 2 *mm* in width and 2½ *mm* in length. Ribbon-shaped keratitis in the early stage of development. The anterior chamber is about two thirds the normal depth. The iris is atrophic and adherent to the capsule of the lens throughout about two thirds of its extent. Two or three radiating slits in the iris in addition to a small coloboma upward and outward. The pupillary area is occupied by a thickened mass of pseudomembrane. The lens presented a yellowish-white appearance

and was of normal size. Perception of light good in all parts of the field of vision. Left eye: The conditions here were similar to those in the right eye, except that they are a little more pronounced. Vision equals perception of light, but the projection is faulty, particularly in the lower nasal portion of the field. As the eye had been quiet for some years and the projection was good, he told the patient that there was a possibility of improving his vision by removing the lens, which was done on the afternoon of January 27th, without loss of vitreous. Progress was favorable and without untoward symptoms until the third day after the operation, when a small hyphæma was present, the blood being bright red in color and apparently from the iris. Four days after the operation the patient was able to count his fingers at one or two feet. The coloboma was not at that time as large as it was immediately after the operation. Aside from a slight opacification of the posterior capsule of the lens, he saw no evidence of a formation of a cicatricial pupillary membrane. A faint reflex from the fundus ought to be obtained, but the vitreous humor did not appear to be perfectly transparent. Tension equals $-\frac{1}{2}$. Eye quiet.

Dr. VALK inquired whether in these cases a preliminary iridectomy would not be a better method, and if so, when would it be advisable to perform it. He referred to a case he had seen in which an unsuccessful attempt had been made to remove the lens.

Dr. WEEKS said that in these cases with atrophic iris adherent to the lens capsule and with cicatricial tissue in the pupillary area, it would be impossible to remove any iris without interfering with the lens capsule. The favorable sign in his case was a good perception of light in all parts of the field.

Dr. W. B. MARPLE presented a **case** (with report of others) in which he had done the **operation** suggested by Dr. E. Gruening for **primary divergent strabismus** (*Trans. Am. Oph. Soc.*, vol. vi., p. 165). The operation consists in a tenotomy of both externi (several millimetres back of the attachment of the tendons) followed by forced adduction of the eyes for twenty-four hours by an adducting suture, as pointed out by Dr. Gruening in this paper. The characteristics of the cases in which this operation is indicated are: 1st. Absolute and constant, not periodic or dynamic, divergence. It is absolutely unsuited to cases of secondary divergence. 2d. Good motility inwards. 3d. Often

associated with a high degree of myopic anisometropia, or unilateral amblyopia (he has seen it with normal vision in each eye).

"Both externi are operated upon at one sitting. In cases of divergence of not more than 2 *mm* the tendons are divided at their points of insertion. Whenever the deviation measures more than 2 *mm* the tendons are divided at a distance from their insertion corresponding to the degree of the squint. The conjunctival wounds are closed by a few interrupted sutures placed horizontally. A silk thread is passed through the conjunctiva over both interni muscles in a line with the horizontal meridian of the cornea and tied over a pledget of cotton on the bridge of the nose, which is left for twenty-four hours."

He has found that sutures introduced in this way were apt to pull the conjunctiva out through the palpebral fissure. In his cases he introduced them near the cornea at its temporal limbus and did not tie them quite so tight. He also excised the stump of the muscle. Simple myotomy without the forced adduction is not sufficient. In each of his cases after the double myotomy there was still divergence. There is apt to be considerable pain as long as the adducting suture is left in. This ceases as soon as this suture is removed. The cosmetic result is excellent, for the region of the caruncle is left undisturbed, which he thinks is a great advantage.

CASE.—Patient, girl, aged twelve; divergent strabismus (O D) of 5 *mm;* she had comp. myopic astigmatism in each eye. R and L vision equal to $\frac{20}{100}$; with correction = $\frac{20}{50}$ both. Divided both externi (August 12, 1902) 5 *mm* from insertion and excised stump. Closed conjunctival wounds. Then introduced silk thread over each externus close to cornea and tied over a pledget of gauze on the bridge of nose. Left in till next day. Patient discharged at end of week. Has perfect mobility in both directions. Absolutely no evidence of any remnant of squint. Converges readily to six inches. Two other cases—one a woman, aged thirty-two (right eye emmetropic, left 16 D myopia, with divergent strabismus in latter eye), and a man aged twenty-seven (similarly emmetropic or nearly so in his right eye, and with high myopia in left)—were operated upon in a similar manner and with equally satisfactory results.

Dr. GRUENING related a case in which vision was $\frac{20}{20}$ in one eye and $\frac{20}{200}$ in the other. Squint = 5 *mm.* He performed tenotomy 5 *mm* from insertion of tendon, and obtained a good result. This

operation was indicated for absolute divergence, and there should be good motility inward. A simple tenotomy and suture will cure a 2 *mm* divergence. If there is a divergence of 3 *mm* to 6 *mm* we should cut the muscle from 3 to 6 *mm* from its insertion. Sutures were important and were kept in for twenty-four hours, producing strong convergence.

Dr. WEEKS remarked that the operation was open to some objection. He thought that cutting muscles so far back affected the rotation of the eye outward without affecting the adducting power. It was necessary to increase the adduction by advancing the interni.

Dr. DUANE disagreed with Dr. Gruening as to the amount of squint corrected by a simple tenotomy. He thought more than 2 *mm* could be corrected by a simple tenotomy.

Dr. SCHAPRINGER presented a case of **typical round black spot at the posterior pole of a highly myopic eye.** There were atrophic choroidal patches with black pigment deposits, often seen in high myopic eyes, with a round black spot, with a light red ring around it. According to Emilie Lehmus (Horner, Zurich), the round black spot was supposed to be due to a hyperplasia of epithelium pigment. Fuchs has observed fifty cases.

Dr. TYSON inquired as to the amount of vision in the eye, as the spot, although located in the posterior polar region, did not embrace the macula.

Dr. SCHAPRINGER replied that he did not know the vision, as he had not recorded it.

Dr. DUANE referred to a similar case in which vision had been reduced from $\frac{20}{40}$ to $\frac{5}{200}$ in three months' time between examinations, during which time the black spot appeared at the macula.

Dr. SEABROOK said that he had seen a similar case, and had never heard of these round black spots becoming atrophic.

Dr. DUANE presented a case of **paralysis of convergence and divergence, with paralysis of the superior rectus** of ten years' standing. He gave the following history: Patient ten years ago, when she was thirteen years old, was suddenly attacked, while walking on the street, with diplopia both vertical and lateral. Examined then and right hyperphoria 9° was found. One year later, tenotomy of right superior rectus, reducing hyperphoria to 4°, then tenotomy of the left inferior rectus, producing marked over-correction. This it was attempted to remedy by tenotomy of the left superior rectus, and subsequently a number of operations

were done. Had also exercised with prisms, and she has worn prisms and various glasses (convex, sphero-cylinders) designed to correct the refraction.

When he first saw her, ten months ago, she had diplopia in every direction of the field of fixation and marked vertigo, with the objective evidences of marked but not complete paralysis of the left superior rectus and a less marked paresis (evidently post-operative) of the right superior and the left inferior recti. Nearly complete paralysis of convergence and divergence, as shown by the following signs: approximate balance for distance (exophoria or crossed diplopia of only one or two degrees); insuperable crossed diplopia beginning at six feet from the eyes and increasing steadily in amount as the object of fixation was carried nearer the eyes; inability to overcome prisms of even one degree either base in or base out; inability to converge even to the slightest degree on a test object carried toward the eyes; absence of pupillary convergence-reaction with retained light-reaction; all this being combined with a perfectly normal excursion of either eye, inward or outward, in performing associated parallel movements. The most annoying symptom being the vertical diplopia in looking down, due to the post-operative insufficiency of the left inferior rectus, he did a carefully graduated tenotomy of the right inferior rectus. This operation, he said, although not the logical one to do under the circumstances, equalized fairly well the difference of level of the images in the lower field. Then during several months systematic efforts were made to develop the converging power by prism exercises and in other ways. A temporary moderate improvement was secured, the patient at one time being able to overcome a five-degree prism, base in, and by extreme effort a prism of nine degrees, base out, and once was able to converge to ten inches. Such momentary restoration of the converging power was always associated with restoration of the convergence-reaction of the pupil. The temporary improvement and convergence were not maintained, and five months ago he did an advancement of the left internus. The immediate result, which was also the permanent result of this operation, was to produce for distance an insuperable homonymous diplopia of ten degrees, which, as the test object was carried toward the eye, steadily diminished, until at seventeen inches from the eye there was single vision, and this at fifteen inches from the eye was replaced by a crossed diplopia that increased steadily as the object

was brought still closer—*i. e.*, all that the operation did was to shift the point of equilibrium from far distance to a point sixteen inches from the eyes. She could not converge the eyes to any point within this distance nor diverge them to any point beyond. Such a condition, although giving her troublesome diplopia on the street, was yet advantageous in that she was enabled to do her work at a typewriter without confusion. Two and one half months ago the right hyperphoria, which had already begun to show a slight increase, suddenly amounted to fifteen or sixteen degrees. This was found to be due to an increase in the paralysis of the left superior rectus, which had now become almost total. Diplopia characteristics,—*i. e.*, vertical diplopia was very marked (35°–40°) in looking up and to the left, was as marked (18°–20°) in looking to the left on the horizontal plane as in looking straight up, while in looking up and to the right it was only four or five degrees. Examination by a neurologist has failed to show any evidence of organic nervous disease. Here the condition originally present was surely a paresis of the left superior rectus, the insufficiencies found in the other vertical muscles being evidently due to operation. Ten years after it first developed, this primary paresis suddenly and without cause increased and became total. The other pathological condition obtaining was a paralysis of convergence and divergence, which, although varying, was nearly complete. He stated that the facts illustrated by this case were as follows: 1st. The unwisdom of attempting to correct a deviation (especially a hyperphoria) due to a paresis of one muscle by a tenotomy of its antagonist. The result is nearly always disastrous. Here with an initial insufficiency of the left superior rectus causing a right hyperphoria, tenotomy of the right superior rectus was proper under the circumstances, but to supplement this by a tenotomy of the left inferior rectus was a serious error. 2d. The care that has to be exercised in handling these paretic affections, which after remaining stationary, it may be for years, suddenly and without cause increase or diminish. 3d. In paralysis of an elevator, the increase of a diplopia in looking to the right or left is fully as great as the increase in looking straight up, and is of more significance for the diagnosis. 4th. The contraction of the pupil taking place when the attention is directed to a near object is a convergence-reaction and not an accommodation-reaction. In this, as in similar cases, it was only when the patient converged, not simply when she accommodated, that the pupil contracted.

5th. The correction of a complete convergence-paralysis by operation is unsatisfactory, about as much so indeed as the correction of a complete paralysis of a muscle by advancement of it. All that the operation accomplished in this case was simply to shift mechanically the point of equilibrium from twenty feet down to sixteen inches. The converging power was not increased at all.

Dr. VALK was of the opinion that cases of paralysis of convergence were due to affections of central origin and that operations were inadvisable. He considered internal medication advisable.

Dr. DUANE **showed drawings of the fundus in a case of aplasia of the optic nerves, with colobomata of the retina at each macula.** (Will be published in the next number with drawings and full review of the incident literature.—H. K.)

Dr ARNOLD KNAPP **presented a specimen of hydrops of the optic-nerve sheath.** He said the specimen belonged to the case of a man forty years old who suffered from a tumor of the cerebellum. In the beginning of October, 1902, vertigo and ataxia set in; later headache and vomiting. Right pupil dilated, optic neuritis more pronounced right than left. He died December 6th. At autopsy, marked flattening of the convolutions. Ventricles distended. A tumor measuring 1 x ¾ inch with a central cyst occupying the anterior margin of the worm and the right superior peduncle. Microscopically the growth was a glioma. On removing the roof of the orbit the typical ampulliform dilatation of the nerve sheath was present. Microscopic sections of the optic nerve and papilla revealed a distension of the subarachnoid space, an œdema of the optic nerve and especially of the papilla, a moderate venous stasis, but no inflammatory products. The case can therefore be regarded as a pure choked disc, The pathology of the optic-nerve changes occurring in intracranial troubles is not completely cleared up. The distinction between choked disc and optic neuritis has in recent years no longer been upheld, some claiming that the changes in all cases are more or less inflammatory in nature, while others have found no signs of inflammation in optic neuritis. The changes in this case seem to be secondary to stasis from increased intracranial pressure. It is well known that tumors in the posterior cranial fossa, even if small, are most apt to cause ophthalmoscopic changes. These must act as in the case just described by exerting direct pressure on the fourth ventricle and the Sylvian aqueduct, producing an internal hydrocephalus.

MEETING OF MARCH 16TH. DR. A. DUANE, CHAIRMAN.

The evening was devoted to a conference on lachrymal disease.

Dr. TAYLOR presented a case of **lachrymal disease in which he relieved the condition by the removal of the whole inferior turbinate and subsequent probing without slitting the canaliculus.**

Dr. BORN spoke about the **expectant treatment of lachrymal disease, indications, contra-indications, and results.** He said that if phlegmon of the sac could not be prevented in the earliest stage by frequent pressing out of the sac and injection of antiseptic solutions, it was best to hasten the formation of the abscess by moist warm compresses. As soon as the presence of pus becomes apparent by fluctuation, a free incision should be made into the anterior wall of the sac, the contents pressed out, and the moist warm compresses continued. Daily cleansing of the sac by syringing and a subsequent injection of a 1 % solution of nitrate of silver into the sac would shorten the course of healing. During this stage of the inflammation, the mucous membrane is swollen, its blood-vessels are engorged, and the folds at the entrance of and in the duct are enlarged. Passing probes without lacerating the tissue would be difficult and traumatic strictures may be the result. He prefers to let the inflammation subside, and after the opening has closed, proceed with the local treatment of the catarrhal inflammation. When the abscess has opened upon the outer wall of the sac and the pus has undermined the skin and produced a fistula upon the cheek, the entire length of the sac is opened and the granulating surface freely cauterized with the nitrate-of-silver crayon.

The treatment of chronic catarrhal inflammation of the sac must first be directed against the cause of the disease in the nose. Obstructions should be removed and inflammation be treated. A large number of cases will yield to persistent local treatment of the conjunctiva and lachrymal sac. The contents of the sac are frequently emptied and astringent eye-washes, solutions of sulphate of zinc, tannic acid, alum, or nitrate of silver instilled two or three times a day or once or twice a week; nitrate-of-silver solution 1 % is injected directly into the sac through the punctum, without slitting the canaliculus, by means of a small lachrymal syringe. Heat applied over the sac several times a day and massage over the sac help to establish a good reaction. If this treatment is

faithfully carried out for several weeks, in some cases for a few months, the dacryocystitis will in very many cases be permanently cured without epiphora, which is frequently observed after the slitting of the canaliculi, whenever there is a hypersecretion of tears.

The function of the tear passages is not simply that of a drainage pipe, but they act as a suction pump. The canaliculi are surrounded by spiral muscular fibres from Horner's muscle, by which they are compressed in winking. The act of winking is an important factor in removing the hypersecretion of tear fluid. Ordinarily the tear glands secrete only sufficient quantity of fluid to keep the conjunctiva, cornea, and tear passages moistened, and only when the eye is irritated or inflamed or upon psychical stimulation a greater supply of tears is furnished, which will run over the cheeks unless removed into the lachrymal passages by frequent winking. The spiral muscles cause a vacuum at the orifices of the canaliculi, into which the tears are drawn when the lids are opened, and they press the contents into the sac when the lids are closed. The elasticity of the walls of the sac may then facilitate the descent of the fluid into the nasal duct. Before resorting to operative treatment we should make at least a reasonable effort to preserve this valuable apparatus. A good result may be expected from astringent treatment as long as the contents of the sac can be freely evacuated into the nose. When local treatment has failed to give relief, the canaliculus is slit and probes are introduced. The upper canaliculus is selected, even though its calibre is smaller, since the lower is more effective in carrying the tears into the sac. In cases of mucocele, total closure of the duct, chronic dacryocystic blennorrhœa with thickening and degeneration of the walls, and in chronic catarrhal inflammation with recurring phlegmonous attacks the sac should be removed. Extirpation of the sac is permissible even in mild cases of catarrhal inflammation, whenever an operation has to be performed on the eyeballs, for instance, before the removal of cataract. In moderate eversion of the lower puncta, the result of irritation and contraction of the lids in long-continued epiphora, partial slitting of the canaliculi with the opening on the conjunctival surface of the canal is generally recommended. He prefers to remove a triangular piece of eyelid at the outer canthus, shortening the lids sufficiently to raise the puncta and bring them in apposition with the eyeball.

Drs. HUNTER and LEWIS confined their **remarks principally** to the **treatment with probes, giving indications, technique, duration of treatment, and outlook for a permanent cure.**

Dr. HUNTER stated that probing was indicated in all the milder cases of catarrh of the sac which do not respond after a reasonable time to the expectant treatment, and in all the severe cases, including phlegmonous dacryocystitis. In the latter class, preliminary treatment by hot fomentation and free external incision should be employed, probes being resorted to after subsidence of pain and swelling. Technique: slitting of canaliculus on conjunctival surface of lid, lateral incision of lachrymal sac, if necessary followed by probing, using as large probes as the bony canal will permit without undue violence, *i. e.*, from No. 6 or 8 to No. 16—Weber probe used first, immediately after incision. Syringing, always before probing, with cleansing solution and astringents, varying in strength from a normal salt solution to a 2 % arg. nitrat. sol. or 25 % argyrol. Duration of treatment: from a month to a lifetime. Styles are sometimes used in the obstinate cases, but, as a rule, only when patient lives at a distance or for some reason cannot be seen often. The most obstinate cases are often only the local manifestation of deeper-seated trouble in ethmoid, or frontal sinus, etc. Outlook for a permanent cure: most of the cases made quite comfortable, but very many are disappointing as regards perfect cure by any method of treatment. He considered that treatment by probes, however, was the most satisfactory method in his hands.

Dr. LEWIS thought that in simple epiphora probes should not be used until other treatment, such as astringents, had failed; that probes should not be used after ophthalmia neonatorum, and never unless the canaliculus was opened. He said that treatment of the nasal membranes often cures. As a technique he advised a free opening backwards and free cut at junction of canaliculus and sac. Probes 6–12 used. Syringed freely with borax solution. Duration: He said chronic cases with simple lachrymal or mucoid secretion do not respond to treatment as quickly as acute dacryocystitis with purulent secretion. Cases of long duration do heal under probing and syringing. Most cases were stricture cases either from swelling of lining membrane or were cicatricial. Hence the chief point in treatment was through drainage.

Dr. CUTLER referred to **cases of delayed opening of the**

naso-lachrymal septum in the new-born, with consequent dacryocystitis. He was of the opinion that dacryocystitis in the new-born was a matter of frequent occurrence and should receive more attention than has been given it. He referred to that disturbance of the lachrymal sac occurring in healthy children, where no constitutional or nasal complications existed except the retention of the partition between the nose and the sac, which leads to an accumulation of the contents of the sac and often to secondary infection. Many of these cases, probably the great majority, are relieved by spontaneous opening of the occluding membrane and are not seen by the oculist. Others are treated for days or weeks by the general practitioner and finally reach the specialist. In these cases, when the condition is simply one of retention, the conjunctiva is hyperæmic, not secreting profusely, and, as a rule, smooth, not the picture of a conjunctivitis. If the condition shows signs of secondary infection of the tear sac, then conjunctivitis is apparent. The puncta are usually patent and on pressure emit a gelatinous or muco-purulent fluid. After a slight nick of the canaliculus, Bowman 3 or 4 passes easily to the floor of the nasal duct. In these cases strictures do not exist. Fluid forced in will often at first not pass to the nose, but regurgitates along the canula; but, after a little manipulation sometimes gently tilting the canula to one side, or after a few days' delay, the use of a 1% silver solution and renewed irrigation have overcome the obstruction, and a sudden gush of mucus from the nostril indicates the end of the process. It has seemed best finally to take these simple measures in ten cases he has been able to observe with care; in some of the cases, after waiting for several weeks or longer with expectant treatment only, such as gentle massage and astringent collyria. In these cases it is quite probable that the membrane at the lower end of the lachrymal sac would have perforated in time, if nothing had been done, but in the meantime the eye was exposed to the profuse secretion, containing organisms capable of starting a serious infection if the cornea had been abraded. Moreover, the infants' nutrition seemed to have been affected to some extent, at least they were less restless and took their food better after a normal condition was reached. Several cases came under observation during the spring or early summer months, when it was necessary for the family to leave the city, and a speedy termination of the difficulty was most desirable. It may also be

suggested that to ignore such a condition, producing constant irritation and congestion and lasting weeks or months, in the belief that nature will restore the parts unaided, is to sow the seeds of more serious trouble in later life. On the other hand, the risk to the child is very slight, if a small Bowman probe is used, and reliance placed chiefly on irrigation with a canula long enough to reach nearly to the lower end of the sac, so that a current of fluid is forced against the obstruction. It is probable that the membrane is not always in a direct line with the axis of the canal, so that irrigation is more effectual as well as more gentle than the deep introduction of the probe. It is important to use a canula the edges of which are not sharp as are most of those in use. The trifling enlargement of the punctum and canaliculus leaves no later impairment of function. These cases, described by Dr. Kip in 1879, Peters in 1891, and Rochon-Duvigneaud in 1899, have added to our knowledge of the subject.

Dr. A. KNAPP described the **radical treatment by extirpation of the lachrymal sac, giving indications and technique.** (Will appear in full in the next number, ARCHIVES OF OPHTHAL.)

Discussion.—Dr. H. KNAPP said that the epiphora from eversion of the puncta could in most cases be cured by brushing a 1% solution of nitrate of silver over the swollen edge of the lower lid and adjacent conjunctiva once a day or every other day for several months. The mucous membrane thus treated cicatrizes, shrinks, and the everted punctum is drawn toward the eyeball.

As to the discharging of puriform matter coming from the lachrymal sac of babies, which had been touched upon by Dr. Lewis, he would say that this was not very rare and would probably have oftener been brought to our notice, did it not spontaneously disappear in the course of weeks or a few months. We should not forget that the lachrymal sac is one of the accessory cavities of the nose, and it is not far-fetched to surmise that at birth it may be more or less filled with muco-pus, as the tympanic cavities invariably are. I, at least, have in all my long career advised parents that brought such children to my consultation room to leave off all fear together with all harsh treatment. Keeping the eyes clean and pressing the region of the sac with a pledget of absorbent cotton was all that was necessary to cure the trouble.

Dr. H. Knapp spoke also of the poor satisfaction of the treatment of epiphora from chronic stricture of the lachrymal duct, by

slitting the canaliculi and probing, but he spoke acknowledgingly of the good results of extirpation or obliteration of the sac in chronic suppuration. In obliteration, by a broad opening and scraping the inner wall with sharp spoons, or destroying the granulations with nitrate of silver, even the lachrymal canal might be restored.

Dr. GRUENING considered extirpation of the sac indicated whenever lachrymal disease is present with cataract, before performing cataract extraction.

Dr. WEEKS thought that in congenital cases condition will clear up with mild treatment if time is given. He had one unfavorable result from probing in these cases, while he had several improve after probing. In cases where he uses a probe he slits the canaliculus, after which they require probing for a time to prevent union of the walls. In epiphora he found syringing unsatisfactory. Probing proved more satisfactory than syringing alone. In cases where probing has not relieved, he has used lead or gold styles, preferring them to silver, which becomes encrusted. Does not advise extirpation of sac for chronic dacryocystitis, dilatation of sac, or fistula.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE SECOND AND THIRD QUARTERS OF THE YEAR 1902.

By Dr. G. ABELSDORFF, in Berlin; Prof. ST. BERNHEIMER, in Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin;

with the assistance of

Dr. A. Alling, New Haven; Prof. E. Berger, Paris; Dr. Dalén, Stockholm; Dr. J. Herrnheiser, Prague; Prof. Hirschmann, Charcow; Dr. J. Jitta, Amsterdam; Dr. Krahnstöver, Rome; Mr. C. Devereux Marshall, London; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; Dr. Heinrich Schulz; and others.

Translated by Dr. Ward A. Holden.

Sections IV.–VII. Reviewed by Dr. G. ABELSDORFF, Berlin.

IV.—ANATOMY.

243. **Naito.** A contribution to the knowledge of the intrascleral nerve loops. *Klin. Monatsbl. f. Augenheilk.*, xl., 11, p. 122.

244. **Sagaguchi.** On the relations of the elastic elements of the choroid to the optic-nerve entrance. *Ibid.*, p. 126.

245. **De Lieto Vollaro.** The arrangement of elastic tissue in the sclero-corneal trabeculæ, and the relation of the latter to the sclera, the tendon of the ciliary muscle, and the membrane of Descemet. *Arch. d'opht.*, xxii., 5, p. 311.

246. **Smirnoff.** The sclera as a location of sensory nerve terminations. *Neurolog. Wjstn.*, ix., 1 (after an abstract in the *Wratschobnaja Gaz.*, 1902, No. 24).

247. **Herzog.** On the development of the intrinsic muscles of the eye. *Arch. f. mikros. Anatomie u. Entwickelungsgeschichte*, lx., p. 517.

Naito (243), examining serial sections of a phthisical eye, confirmed Axenfeld's statement that the picture of ciliary nerves

passing transversely through the sclera is brought about by the ciliary nerve passing forward, then entering the sclera and bending back in a loop to enter the suprachoroidea and again extend forward.

SAGAGUCHI (244) has used not only the orcein method but also the Weigert stain for demonstrating the elastic elements of the choroid. A direct continuation of the fibres of the lamina vitrea into the optic nerve could not be made out, but the network of fine elastic fibres lying on the outer surface of the lamina vitrea interlaces with the marginal tissue and enters the optic nerve. The other elastic tissues of the choroid interlace so with the marginal tissues that they cannot be followed uninterruptedly into the optic nerve. Besides the larger scleral portion, choroidal fibres also may be readily seen to enter the optic nerve.

DE LIETO VOLLARO (245) studied the elastic fibres in the sclero-corneal meshwork between the sclera and tendon of the ciliary muscles on one side and the cornea with Descemet's membrane on the other, which separates the anterior chamber from Schlemm's canal. He found in the sclera, in the region of the tendon of the ciliary muscles, numerous elastic ring fibres. These elastic fibres ran in various directions and, forming a fine grill-work, extended to the chamber angle and the root of the iris. The meshwork of elastic fibres continues from the sclera into the deeper layers of the cornea.

All elastic fibres possess a connective-tissue sheath arising from the connective tissue and containing endothelium. The endothelium passes over upon Descemet's membrane, which begins abruptly and has no relation to the elastic tissue.

V. MITTELSTÄDT.

SMIRNOFF'S (246) histological studies of the sclera in man, the rabbit, and the dog show that, besides the nerve-endings in the vessel wall, there are other free nerve-endings in the bundles of fibres producing the cement substance. Thus the sclera is not only a mechanical apparatus and a means of passage for the nerves and vessels to the deeper portions of the eye, but also a sensory capsule of the ball. HIRSCHMANN.

V.—PHYSIOLOGY.

248. **Hess.** Further investigations on total color-blindness. *Zeitschr. f. Psychol. u. Physiol. d. Sinnesorgane*, xxix., p. 183.

249. **Broca.** On the perception of colored signals and tests for color perception. *Ann. d'ocul.*, cxxviii., p. 265.

250. **Himstedt** and **Nagel.** Experiments on the excitation produced by various sorts of rays on the eyes of man and animals. *Festschr. d. Univ. Freiburg z. 50 jähr. Regierungsjubiläum S. K. H. d. Grossherzog Friedrich v. Baden*, 1902, p. 259.

251. **Lodato** and **Pirrone.** On the association paths between the two retinas. *Arch. di Ottalm.*, ix., 9, 10.

252. **Schenk** and **Just.** On intermittent excitation of the retina. *Pflueger's Arch. d. Physiol.*, xc., p. 270.

253. **Grützner.** Some experiments on stereoscopic vision. *Ibid.* (Not adapted for an abstract.)

254. **Tschermak, A.** Studies on the binocular vision of the vertebrates. Preliminary contribution. *Pflueger's Arch. f. Physiol.*, xc., p. 270.

255. **v. Várady.** Investigations on the oculo-pupillary sensory reflex. *Wiener klin. Wochenschr.*, No. 12, p. 310.

256. **Stewart, G. N.** A remark on dilatation of the pupil from excitation of the cerebral cortex. *Centralbl. f. Physiol.*, No. 21, 1902. (The dilatation follows excitation of a point near the sulcus cruciatus.)

257. **Ruge.** On the centre of the pupillary reflex and the pupillary reflex arc. *Graefe's Archiv*, liv., p. 483.

258. **Colombo.** A new experimental contribution to the study of the relations between the visual angle and the light. *Bulletino della Scienze Med., Bologna*, lxxii., ii., fasc. 4.

259. **Crzellitzer.** On the visibility of the Roentgen rays. *Fortschr. a. d. Geb. d. Roentgenstrahlen*, v. 4, p. 245.

260. **Verhoeff.** A theory of binocular perception and some remarks upon torsion of the eyes, the theory of vicarious fovea, and the relation of convergence to the perception of relief and distance. *Annals of Ophth.*, April, 1902.

Himstedt and Nagel (250) have studied the action of various homogeneous rays on animals' eyes by means of the so-called retina-action currents, and find by this method that the eyes of frogs and owls which have been kept in the dark are sensitive to the Roentgen rays. In the hen's eye, which is free from rods, neither a weak illumination nor the Roentgen rays produced an electromotor reaction, and this was brought about only by intense illumination. In this respect the authors see an indication of the rods as a dark apparatus, which is wanting in the hen's eye.

The visibility of the ultra-violet, Becquerel, and Roentgen rays is chiefly referred to fluorescence, the last-named rays causing fluorescence in the retina alone, the two others in the other refractive media also. The view of Parinaud, that perception of the ultra-violet depends upon fluorescence of the visual purple, is rendered improbable, since analogous to Kühne's observation that fluorescence is more marked in the bleached retina than in the

unbleached, the sensitiveness for ultra-violet is increased by adaptation for dark—*i. e.*, in an eye rich in purple.

At the close of the paper the authors report a very interesting experiment in regard to the power of distinguishing colors possessed by animals. A poodle will learn to fetch a red-colored object from among similar objects of different colors when the word "red" is said; and since the experiment is successful when colors of different luminosity are used, the existence of actual color discrimination cannot be denied.

LODATO and PIRRONE (251) carried out experiments on the condition of the retina of one eye of a frog long kept dark when the other eye had been exposed half an hour to direct sunlight. The experiments were made with:

1. Normal animals.
2. After removal of the cerebral cortex.
3. After destruction of all communication between the retina and the centre, leaving the chiasm untouched.
4. After division of both optic nerves.

The results were:

1. In both eyes contraction of the rods and conus and migration of pigment.
2. In both eyes contraction of the retinal elements over an equal area but of less degree in the resting eye.
3. In the resting eye the emigration of pigment does not reach the limitans externus as in the eye exposed to light, and is more marked in the nasal than in the temporal periphery. This difference is constant and when the illumination has been weak a movement of the pigment granules can be found only in the nasal periphery.
4. Changes are observed in the illuminated eye alone even when only a single nerve is divided. KRAHNSTÖVER.

SCHENK and JUST (252) in this tenth report come to the following conclusions from experiments with rotating discs: When a sector of the disc composed of black and white elements and another of an equivalent gray act on the retina alternately, the time required to blend the black-white group is smaller the longer the duration of the gray in comparison with the duration of the other. When the retina is excited alternately with a number of succeeding black-white groups and with a number of equivalent grays, the increase in the number of the black-white groups and the duration of the action of the gray acts unfavorably on the blending of the light perceptions.

Tschermak (254) has proposed an objective method of determining the location and extent of the binocular field of vision in the vertebrates. He observes the inverted retinal image of a light after the posterior portion of the eye has been exposed, and he brings the light nearer until an image can just be seen in either eye. The lateral extent of the binocular field is measured by moving the light in an arc. He found that in all the vertebrates examined even when there was total decussation of the nerves, as in the hen and dove, a binocular field exists. Naturally the field is limited in animals with marked divergence of the ocular axes, and the middle point of the binocular area does not lie near the optic axis as does the fovea in man. The paper concludes with hypotheses in regard to the correspondence and the associated action of the binocular retinal area in the vertebrates.

Várady's (255) investigations were in regard to the phenomenon described by Stefani and Nordera, viz., that after a sensory excitation mydriasis comes on followed by myosis, and if the excitation continues mydriasis comes on again and is again followed by myosis. Várady finds that the most practical method is to stick a needle into the skin near the eye, and then observe the reflex phase which begins with dilatation and ends with contraction of the pupil. The degree of the reflex differed in different persons, while the reflex was wanting in many healthy persons and in cases of functional disturbances of sensibility—*e. g.*, hysterical anæsthesia or hyperæsthesia might either be present or absent, showing that the production of the reflex excluded with certainty the presence of an organic anæsthesia.

Ruge's (257) experiments on decapitated heads of rabbits and cats, even after complete division of the medulla oblongata, revealed perceptible pupillary reaction, and thus failed to substantiate Bach's idea of the spinal location of the centre for the pupillary reflex. So much for the facts. Ruge adds the hypothesis that in reflex iridoplegia an affection exists of the root of the sympathetic in the cervical portion of the cord, and since the motor excitation in the ciliary ganglion is carried to cells of the sympathetic system, the ciliary nerves thus lose their power of conduction—that is, an interruption is brought about in the pupillary reflex arc.

Colombo (258), after numerous investigations of the acuteness of vision of one eye when adapted for strong and very weak lights, comes to the following conclusions:

1. The eye attains its highest acuteness of vision with an illumination—less and often considerably less—than one normal candle.

2. Of two eyes examined under physiological conditions, that with the better acuteness of vision reaches its most perfect vision in the least illumination in which perfect vision is still attainable.

The original paper must be consulted for an accurate account of the methods of investigation and the various conditions, as to illumination, test types, and the like, under which the experiments were made. KRAHNSTÖVER.

CRZELLITZER'S (259) experiments show that the Roentgen rays are visible to the dark adapted eye. The conflicting reports of other observers are to be explained by the fact that only hard tubes are proper for eliciting the phenomena, which are seen in the form of a diffuse bright disc or of a pale light ring with a paler included field. Although in the experiments the right half of the retina was acted upon more intensely than the left, there was no difference in the perception between the right and left halves, in which the writer sees a proof for the inconsiderable absorption of the rays by the sclera and retina.

"Since the brightest spot does not lie in the middle of the field of vision, the region of the macula can possess no particular sensibility for the Roentgen rays as it does in ordinary vision." As we know, the macula is not the point of most acute vision for weak light when the eye is in a condition of dark adaptation—an analogy not mentioned by the writer.

When the Roentgen rays are allowed to pass along the cheek, the equatorial portion of the retina proves to be particularly excitable. The author leaves the question open whether the greater sensibility is due to the percipient elements of this region or is simulated on account of the lack of bone shadow here.

VERHOEFF (260) offers to explain binocular vision on the theory that there are three cortical centres, one for each eye, which can be used independently, and a third for binocular perception. The latter centre would be regarded as representing the so-called cyclopean eye. Anatomical localization is of course impossible. An image is produced by the impulses passing from the two uniocular systems and acting jointly upon the cyclopean centre. Under ordinary conditions the uniocular images are inhibited, although according to the theory every object not lying upon the horopter is represented in the brain by three images—two

uniocular and one binocular. The author demonstrates the possibility of seeing these three images under favorable conditions.

ALLING.

VI.—REFRACTION AND ACCOMMODATION.

261. **Schmidtlein.** A contribution to the subject of myopia of high degree. *Inaug. Dissert.*, Tübingen, 1902.

262. **Helmbrecht.** A statistical contribution to the subject of hyperopia. *Ibid.*

263. **Guttmann.** A statistical contribution to the etiology of myopia of high degree. *Graefe's Archiv*, liv., p. 268.

264. **Voigt.** On the operative treatment of high myopia by means of extraction of the transparent lens and its results. *Ibid.*, p. 227.

265. **Chevallereau.** On the total correction of myopia. *Ann. d'ocul.*, cxxviii., p. 186.

266. **Sulzer.** Rapidly developing myopia probably of syphilitic origin. *Bull. d. l. soc. d'opht. de Paris*, June 3, 1902.

267. **Römer** and **Dufour.** Experimental and critical investigations on the question as to the influence of the sympathetic on the accommodative process. *Graefe's Archiv*, liv., p. 491.

268. **Fromaget.** Ocular spasm of 9 dioptries in a hyperope of twenty. *Bull. d. l. soc. de méd. et de chirurg. de Bordeaux*, Feb. 21, 1902.

269. **Weidlich.** The optical significance of the accommodative play of the pupil. *Arch. f. Augenheilk.*, xlv., p. 119.

SCHMIDTLEIN'S (261) statistics of 419 myopes of 10. D or more, observed in the Tübingen clinic, showed that females were more frequently myopic than males and that the average acuteness of vision decreases with the increase of myopia. In a great number of cases close work was not a factor, nor did heredity play an important rôle. As complications, affections of the macula were found in 43.6 % and detachment of the retina in 3.9 %.

HELMBRECHT (262) collected 1000 hyperopes from the Tübingen clinic with 1455 eyes free from complications and available for visual tests. The highest degree observed was 15. D in a patient with pure microphthalmus. From the tables it appears that there is a gradual decrease in acuteness of vision with advanced degrees of hyperopia, the average vision in persons with + 1. being 0.96; with + 4. D, 0.89; and then there is progressive sinking of vision in the higher degree up to 0.11 with 15. D.

GUTTMANN (263) has studied the etiology of myopia with reference to occupation in Magnus's policlinic.

Among 49,200 patients there were 3688, or 7.5 %, with myopia in both eyes; 2688, or 7.3 %, had myopia of less than 6. D, of which

65.3 % were males and only 34.7 % females. In high myopia the ratio was reversed, there being 36 % of males and 64 % of females. Among the cases of high degree only a third of the males and a fifth of the females were engaged in close work, so that the other cases must be regarded as so-called genuine cases of myopia. The highest degrees of myopia (10. D or over) were found in women twice as often as in men; in the latter, this high degree was particularly rare in those who did much near work.

Fundus complications were twice as frequent in myopia above 10. D as in myopia between 6. and 10. D; the most frequent complication being changes at the macula, and detachment being rare. The greatest number of complications was found in the fifth decade of life. An inheritance of myopia could be excluded in more than two thirds of the cases of high myopia.

VOIGT (264) reports on the results of 100 eyes with high myopia (over 15. D) operated on in the Leipsic clinic. Forty patients with 57 eyes were operated on by Fukala's method, and in 54 with 81 eyes primary linear extraction was done as Sattler advised at the Heidelberg Congress in 1898. When the latter method was used, the course of healing was shorter and the number of operations less, but loss of vitreous was more frequent, without, however, rendering the final result less favorable. Two eyes were lost by infection after primary linear extraction and one after discission of secondary cataract—two per cent. of loss. Within a period of from one to thirteen months after the operation there was detachment of the retina in 9 cases, in 5 of which no cause could be discovered, and in 3 patients macular hemorrhages took place later. In general both eyes were operated upon in order to secure binocular vision and to prevent the use of the unoperated myopic eye for near work with the associated excessive convergence.

CHEVALLEREAU (265) combats the idea that accommodation plays a part in the etiology of myopia. It is wrong not to give a myope his full correction. The writer cannot agree with Javal, who in low degrees of myopia did not give concave glasses for distance but ordered them for near, correcting the vision for a distance of 25 *cm* without accommodative strain. The studies of Giraud-Toulon proved that myopia and its complications were caused by the strain of convergence. Chevallereau corrected the myopia in full for distance and for 33 *cm* near. In agreement with Förster (1883), Dor (1897), and others he had very good results with this method. BERGER.

SULZER (266) presented a woman of twenty-three who had been infected with syphilis eleven months before, in whom in the course of a few weeks a myopia of 9. or 10. D had developed. In each eye there was a posterior staphyloma which had increased since the patient came under his observation. The writer recalls two cases reported by Kugel (*Graefe's Archiv*, xvi., p. 323) in which in consequence of metastatic chorio-retinitis (following chronic meningo-encephalitis) a considerable increase had taken place in the length of the axis of the ball. BERGER.

RÖMER and DUFOUR (267) object to the view of Morat and Doyon, that the sympathetic is to be regarded as a nerve checking accommodation, since they show that the enlargement of the reflex from the anterior surface of the lens, shown by these writers to occur when the sympathetic was excited, is not an absolute indication of flattening of the anterior surface of the lens because at the same time a dilatation of the pupil takes place. They were able, further, by electrical excitation of the ciliary muscle in the dog to show a movement of a needle sticking into the muscle which corresponded to a contraction of the muscle. The needle remained fixed, however, when during the contraction the sympathetic was excited, and a needle thrust through the cornea and impinging on the lens capsule also remained fixed when the sympathetic was excited. Therefore the sympathetic can have no influence on accommodation.

WEIDLICH (269) states that the contraction of the pupil in accommodation is of optical significance in two respects: 1. A certain uniformity of luminosity in the retinal image is obtained for objects at various distances, since if the pupil remained always of the same width near points would send broader bundles of light into the eye than points farther away. 2. The spherical aberration is diminished because the peripheric rays are cut off; since with increased curvature of the lens the central area, in which the peripheric rays do not cause disturbance, diminishes, the contraction of the pupil by limiting the central area prevents the formation of diffusion circles.

VII.—MUSCLES AND NERVES.

270. **Elschnig.** Diagram of the mode of action of the motor muscles of the eye. *Wiener klin. Wochenschr.*, No. 35, 1902. (A very plain graphic schema.)

271. **Heimann.** Unilateral nystagmus. *Klin. Monatsbl. f. Augenheilk.*, xl., II, p. 99.

272. **Simon.** The importance of unilateral nystagmus for the doctrine of ocular movements. *Centralbl. f. prakt. Augenheilk.*, xxvi., p. 113.

273. **Simon.** On Hering's experiment with the falling balls in cases of strabismus. *Ibid.*, xxvi.

274. **v. zur Nedden.** A peculiar case of disturbance of motility in an eye. *Klin. Monatsbl. f. Augenheilk.*, xl., 11, p. 25.

275. **Varese.** A congenital and hereditary anomaly in the movement of the eye. *Arch. di Ottalm.*, ix., 3–4.

276. **Terrien.** Traumatic paralysis of the inferior rectus muscle. *Arch. d' opht.*, xxii., 4, p. 274.

277. **Fröhlich.** On tenotomy and muscular advancement. *Arch. f. Augenheilk.*, xlv., p. 304.

278. **Schoeler.** On squint operations in cases of congenital paralysis of the external rectus muscle. *Berl. klin. Wochenschr.*, No. 33, 1902.

279. **Koster.** The operative treatment of strabismus complicated with torsion of the ball. *Zeitschr. f. Augenheilk.*, viii., p. 1.

280. **Neuburger.** Paralyses of the ocular muscles after severe hemorrhage. *Centralbl. f. prakt. Augenheilk.*, xxvi., p. 161.

281. **Gelpke.** On the prognosis of ocular paralyses of intracranial origin. *Beiträge zur Augenheilk.*, lii., p. 51.

282. **Berger** and **Loewy.** On the trophic nerves of the cornea. *Bull. de la soc. de biologie de Paris*, June 7, 1902.

283. **Posey.** Unusual choteiform alterations in the width of the palpebral fissure of both eyes occasioned by spasm of the levator palpebræ muscles. *Journ. Mental and Nervous Disease*, July, 1902.

HEIMANN (271) rubricates unilateral nystagmus as appearing: 1, in squinting weak-sighted eyes; 2, in cases of nervous and cerebral disease; 3, in the spasmus nutans of children. In the first form the writer believes that with the impulse to fixation the child turns the eye in various directions, but this movement soon ceases in the good eye while it continues in the amblyopic.

SIMON (272) observed two infants, one 2 months and the other 14 months old, in whom nystagmus developed on account of a corneal opacity. In one case the opacity and the nystagmus were unilateral, in the other both eyes were affected, but the opacity of the left eye clearing up more quickly, the nystagmus ceased first in this eye. The writer states that these observations accord with difficulty with Hering's law, that from birth the eyes are in connection and always are innervated equally. They indicate rather that the connection at birth is slight and increases more and more with advance in years.

SIMON (273) reports four further cases of periodic divergent strabismus in which, notwithstanding an imperfect union of stereoscopic images, Hering's experiment was successfully performed,

there being thus binocular fixation, so that on account of the latter and not in spite of the squint the experiment resulted positively, and this can rightly be regarded as a criterion of binocular vision.

v. zur Nedden (274) reports first on a fourteen-year-old patient with a congenital defect in motility in the left eye toward the left and a limitation toward the right. With forceps the ball could easily be abducted, but attempts at adduction were prevented by an obstacle. The author assumes that in place of the external rectus there was an elastic band limiting motility inward. In the second case a patient of twenty-two had ptosis and divergent strabismus in the right eye. It was noteworthy that when both eyes looked to the right the right eye deviated outward, when both eyes looked to the left the right eye deviated down and in, but by itself alone when the left eye was covered the right eye could not be moved outward. In making a tenotomy of the right external rectus it was found that the tendon was inserted very far back.

Varese's (275) patient was a young man whose left eye when he looked to the right did not turn to the right but sank into the orbit. The other movements of the left eye were all possible, though of limited extent, without any sinking into the orbit. Only when the movement was accomplished by straining the muscles there was a slight retraction of the left eye. The author believes that there was a faulty development of Tenon's capsule, particularly in the part composing the muscle sheath, so that the recti exercised traction in a purely perpendicular direction without sufficient working in opposition of the oblique and Tenon's capsule, which because of its insufficient attachment at the orbital margin was drawn backwards.

Terrien's (276) patient was a girl of thirteen, who, three weeks before, after a blow with a broomstick, had hemorrhage of the nose and a swelling of the left antral region; there then came on paralysis of the left inferior rectus with corresponding diplopia. A bony fracture of the margin of the orbit could be excluded. Three weeks later, on blowing her nose, dark liquid blood and a large coagulum escaped from the left nostril, the paralysis passed off, and the antrum could be transilluminated again. Probably the hemorrhage in the antrum reached to the floor of the orbit and mechanically interfered with the function of the inferior rectus.

v. Mittelstädt.

FRÖHLICH (277) prefers muscular advancement, even in slight deviations, to tenotomy, and he describes the technique he employs. In deviations of moderate degree he does a bilateral advancement without tenotomy of the antagonists. His experience leads him to believe that by this operation one can more surely obtain a complete correction with the least possible insufficiency and without unpleasant late results.

SCHOELER (278) reports on the unusual operative course of three cases of congenital paralysis of the externus (among eight cases operated on), once in capsular advancement of the externus, once in dividing the tendon of the internus, and once in preparing the tendon of the externus and of the internus, the ball was opened and the vitreous exposed. The writer calls attention to this accident, which may be due to a flat adherence between the tendon and the sclera, but which does not interfere with the course of healing, in order to prevent an unpleasant surprise when this accident occurs.

KOSTER (279) discusses the operative treatment of strabismus due to paralysis of ocular muscles, and comes to the following conclusions:

1. Post-paralytic strabismus may be operated on when the paralysis itself has practically passed off. Even extensive deviations can then be corrected by tenotomy or advancement in one eye or both.

2. Temporal or nasal rotary strabismus must be corrected chiefly in the eye in which it has arisen. Convergent and divergent strabismus, as well as strabismus sursum- or deorsum-vergens, can be corrected on either eye, although one must take into account the extent of the field for the gaze.

3. In order to correct rotation (torsion) of the eye, one may employ either:

(*a*) Advancement of the inferior rectus or tenotomy of the superior rectus for temporal rotation, and the contrary for nasal rotation.

(*b*) Tenotomy of one of the rectus muscles with division of Tenon's capsule to one side of the muscle tendon and parallel to the limbus of the cornea, on that side of the tendon toward which the eye must be rotated.

(*c*) Lateral advancement of the insertion of one of the rectus muscles in the direction opposite to the rotation wished for. For every 3° of temporal rotation the tendon must be shortened

1 *mm*, and 1 *mm* also for every 9° of nasal rotation. One must take care to divide Tenon's capsule completely along the ball in a direction perpendicular to the tendon and not along the muscle.

The lateral advancement of the insertion must be about 3 *mm* for all degrees of rotation; only when the muscular advancement is made more excessive to correct some other deviation the lateral advancement may be somewhat less.

4. In order to obtain an accurate correction it is advisable to direct the operation according to the double images.

JITTA.

NEUBURGER (280) observed in a girl of nineteen a bilateral paralysis of the external rectus, following severe hemorrhages from the stomach, with final recovery. The same paralysis with eventual recovery was seen in a woman who had suffered severe hemorrhage from placenta prævia. In the latter case there was also neuro-retinitis, and for a few days ptosis, disturbances of sensation in the region supplied by the fifth nerves, and difficulty in moving the tongue, indicating disturbances in the hypoglossus. All the symptoms passed off. They were attributed to neuritic processes in the cerebral nerves.

GELPKE (281) has tabulated 147 cases of ocular-muscle paralysis of intracranial origin, which he had personally examined, and discusses the prognosis from the following three view-points:

1. Is an intracranial ocular-muscle paralysis, with apparent good health, evidence of cerebral or spinal disease? Fifty-seven per cent. of those previously healthy remained healthy, while in one third of the cases a nervous disease manifested itself.

2. What prognostic deductions can be drawn from an intracranial paralysis in a case of brain disease that is already manifest? The best prognosis in respect of the ocular-muscle paralysis and satisfactory general condition is in the basilar forms with 61.5 %, the worst the cortical with 70 %, and between these the fascicular and nuclear paralyses. The prognosis is thus poorer the higher the location of the injury.

3. Do these paralyses throw any light upon the etiology and, consequently, upon the amenability to treatment? Fifty per cent. were due to syphilis, as follows: paralysis of the oculomotor nerve, 38.1 %; of the abducens, 17.5 %; of the trochlearis, 14.3 %. Of the nuclear paralyses 77.3 % are due to syphilis, of the basilar, 16.7 %, and of the cortical and fascicular 3 %.

Next to syphilis comes arterio-sclerosis, present in 47.8 per cent. of the paralyses of the abducens.

BERGER and LOEWY (282) observed a case in which a traumatic basilar hemorrhage caused paresis of the left fifth, sixth, seventh, and eighth nerves and of the left sympathetic. There was neuro-paralytic keratitis on the left side with increased secretion of tears.

A careful study of a series of undoubted cases of neuro-paralytic keratitis shows that the affection cannot be explained by trauma, drying, or sensory and vasomotor disturbances, and that possibly the idea of trophic corneal nerves may be maintained. Neuro-paralytic keratitis may come on after extirpation of the Gasserian ganglion without symptoms of paralysis of the sympathetic. The operation, however, is rarely followed by neuro-paralytic keratitis. The writers explain the affection by supposing that in man in most cases the trophic fibres for the cornea running in the fifth nerve do not pass through the Gasserian ganglion but reach the orbit by way of the carotid and cavernous plexus, and then, probably through the recognized anastomoses with the supraorbital nerve and its branches, reach the cornea. It is not to be assumed that in man these trophic fibres pass with the sympathetic root to the ciliary ganglion, since section of these fibres or extirpation of the ciliary ganglion does not lead to neuro-paralytic keratitis.

Probably exceptionally in man the greater number of the trophic corneal fibres pass through the Gasserian ganglion, and in such cases extirpation of the ganglion would bring about a neuro-paralytic keratitis without symptoms on the part of the sympathetic, as for example in Gallemaert's case. The writers explain the sensory and sympathetic disturbances which so frequently accompany neuro-paralytic keratitis by supposing that the same process affects the trigeminus at the point where it receives the trophic corneal fibres and at the same time causes a lesion of the sympathetic in the carotid plexus. In their case the lesion was a basilar hemorrhage. BERGER.

In the case related by POSEY (283) the palpebral fissure was rhythmically widened about fifteen to twenty times a minute, yet seemed to be under the control of the will. The elevation of the upper lid was produced entirely by the levator without any action of the frontalis. ALLING.

Sections VIII.–XII. Reviewed by DR. R. SCHWEIGGER, Berlin.

VIII.—LIDS.

284. **Pflugk.** On the preparation of the lid margin and lashes for operations on the eyeball. *Arch. f. Augenheilk.*, xlv., 3, 176.

285. **Pflüger.** The treatment of lagophthalmus. *Klin. Monatsbl. f. Augenheilk.*, xl., p. 527.

286. **Bossalino.** A new operative method of tarsorrhaphy. *Ann. di Ottalm.*, xxxi., 3–5.

287. **Meyerhof, Max.** The making of new lids and transplantation in ophthalmic surgery. *Arch. f. Augenheilk.*, xlv., p. 97.

288. **Büdinger.** A method of restoring defects in the lids. *Wiener klin. Wochenschr.*, 1902, No. 25.

289. **Tiffany, Flavel.** Palpebral autoplasty, a large flap of skin used to restore the lids. *Rec. d'opht.*, xxiv., p. 218.

290. **Santucci.** A contribution to the study of ocular dermoids. *Giorn. med. del R. Exercito*, l., 1.

291. **Rindfleisch.** A case of unilateral grayness of the lashes in a child. *Klin. Monatsbl. f. Augenheilk.*, xl., 11, p. 53.

292. **Marple.** Infection of the lids and subsequently of the globe, with staphylococcus pyogenes albus. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1902.

PFLUGK (284) found the lashes of the normal eye crowded with micro-organisms with few exceptions. These can be readily removed by rubbing the lashes with benzine.

In Basedow's disease PFLÜGER (285) substitutes for the usual pressure bandage inflated rubber bags modelled to the shape of the eye when the lids are closed. These are worn at night and for an hour at a time by day, the amount of pressure being regulated by a bandage passing over them. With this treatment he has seen an operation rendered unnecessary and the exophthalmus even diminish.

In lagophthalmus from incurable facial paralysis, in shortening of the lid, and in senile ectropium, Pflüger substitutes for tarsorrhaphy one or more subcutaneous sutures in the entire extent of the palpebral fissure by introducing two or three sutures, which at the first sitting are tightened like the string of a pouch, and are from time to time drawn tighter until they cut through.

BOSSALINO'S (286) method begins with the splitting of the intermarginal space of the lid 3 *mm* deep, so that in the upper segment lie the hair follicles and ducts of the glands. A double armed suture is then passed through the conjunctiva 1 *mm* from the margin, so that when the loop is drawn the thread lies on the conjunctiva. Both needles are then passed parallel up through the

cleft in the lid and brought out 2 *cm* above the lid margin. The mucosa is then drawn up into the cleft and the sutures tied over the skin. KRAHNSTÖVER.

Taking as a basis three operations by Augstein, MEYERHOF (287) discusses the advantages of supplying large defects in the lids by pedunculated flaps; in one case a flap without a pedicle became gangrenous.

In the matter of replacing mucosa the writer gives a *résumé* of the literature, and inclines to the opinion that the transplantation of vaginal mucosa is best.

BÜDINGER (288) takes skin flaps from the temporal region or cheek; tarsus and conjunctiva are replaced by flaps from the auricle.

SANTUCCI (290) classifies all dermoids of the eye as follows:

1. Pure dermoids, always congenital, caused by the turning in of elements of the upper lid in fœtal life.

2. Congenital lipomas.

3. Lipodermoids.

4. Teratomata covered with conjunctiva. These are rare, arise from residua of the third lid, and are attached to the eyeball. Often they are subconjunctival lipomas with the turning in of lachrymal or Krause's glands. In this form there are found also muscle, cartilage, and bone.

5. Teratomata covered with skin. Of five cases observed by the writer two fell under 1, two under 3, and one under 5.

KRAHNSTÖVER.

In a weakly child of five RINDFLEISCH (291) found that on one eye which was otherwise normal the lashes had been growing gray for three months. The child exhibited no special morbid symptoms but remained weak after an inflammation of the lungs some time before. Microscopically he found the lashes, which were fast in the lid margin, lacking in the usual collection of air bubbles in the cortical layer.

MARPLE'S (292) case showed ulceration at the margin of the lids, and later of the ocular conjunctiva, covered with a gray exudate resembling diphtheria. The glands of the jaw were swollen and some constitutional symptoms were present. Staph. pyog. alb. proved to be the cause of infection. ALLING.

IX.—LACHRYMAL APPARATUS.

293. **Grimaldi.** A clinical contribution to dacryo-adenitis acuta. *Giorn. intern. delle Scienze med.*, xxiv., 8.

294. **Terson** and **Lefas.** Lesions of the palpebral lachrymal gland in hypersecretion of tears. *Ann. d'ocul.*, cxxvii., p. 409.

295. **Tobias.** A contribution to the knowledge of tumors of the lachrymal gland and their treatment by Krönlein's method. *Inaug. Dissert.*, Freiburg, 1902.

296. **Lundsgaard.** Does the lachrymal gland atrophy after extirpation of the lachrymal sac? *Dansk oftalm. Selskab*, March 20, 1902, and *Hospit. tid.*, June, 1902.

297. **Segelken.** The etiology of concrements in the lachrymal canaliculi. *Klin. Monatsbl. f. Augenheilk.*, xl., 2, p. 134.

298. **Tartuferi.** Pathology of chronic catarrhal and purulent dacryocystitis and curettage of the nasal duct. *Arch. d'opht.*, xxii., 3, p. 166. With several tables and many illustrations.

299. **Tartuferi.** *Ibid. Bull. delle Scienze med. di Bologna*, lxxiii., 2, fasc. 3.

300. **Hirsch.** On congenital dacryo-cystitis. *Arch. f. Augenheilk.*, xlv., 4, p. 291.

301. **Cirincione.** On the prelachrymal tumor. *Ann. d'ocul.*, cxxviii., p. 107. With illustrations.

GRIMALDI's (293) case was in a woman of twenty-three. There was dacryo-adenitis on either side, only the palpebral portion of the gland being involved. The cause, according to the writer, was a blennorrhagic infection acquired a short time before.

KRAHNSTÖVER.

In a case of hypersecretion of the lachrymal gland which was cured by extirpation of the palpebral glands, TERSON and LEFAS (294) found changes similar to those found by Klippel and Lefas in the salivary glands of tabic patients with sialorrhœa, and by Stanculeanu and Theohari in the lachrymal glands in cases of dacryorrhœa, viz., circumlobular sclerosis, fatty degeneration and necrosis of the gland cells, and slight changes in the larger gland canals, which perhaps were of infectious nature. BERGER.

LUNDSGAARD (296) made various microscopic sections from a patient who died some time after an extirpation of the tear sac which relieved his lachrymation. The preparations were: 1. Section through the scar, which showed that the cause of the cessation of lachrymation does not lie in the formation of a filtration canal. 2. Sections of the lachrymal gland on either side. These offer no support for the view held by some authors that the cessation of the lachrymation is due to an atrophy of the gland. DALÉN.

SEGELKEN'S (297) patient, after a bit of hay had fallen into his eye, was treated for more than a year with astringents because of an intense inflammation of the tarsal and bulbar conjunctiva with mucous and purulent secretion. The upper canaliculus appeared

swollen and after being split open evacuated dark-brownish concrements which microscopically were found to contain leptothrix. Cultures were not successful. Segelken regards culture experiments as being necessary to distinguish between leptothrix and actinomyces. The conjunctival secretion contained staphylococci and ceased after the canaliculus was cleared out.

TARTUFERI (298) removed after death the nasal duct of each side from patients in whom in life a diagnosis of chronic purulent dacryocystitis had been made, and also a number of ducts from new-born infants. Both the sacs and the canals exhibited great variations in form and calibre and in some instances longitudinal septa with accessory crypts and canals. These formations are in part congenital and were found on the healthy side and in the new-born. They predispose to lachrymal disease. In other cases they are the products of inflammation of the mucosa in which there are epithelial changes and diffuse or circumscribed small-celled infiltration of the tissues, leading to the formation of papillary proliferations and polypi and finally to narrowing of the canal, division into several canals, and blocking of the lumen completely. Since the canal is primarily affected and more affected than the other parts it is necessary to restore its lumen, and when probes will not accomplish this curettes must be freely used. The author pictures a number of curettes of different construction. v. MITTELSTÄDT.

In several cases of congenital dacryocystitis HIRSCH (300) found pneumococci which probably had come from the vaginal secretion of the mother. By the simple therapy of expressing the contents of the sac, one often sees that the cocci cannot have the relation to this blennorrhœa that they are supposed to have. Hirsch found the left side affected oftener than the right.

CIRINCIONE (301) believes with Rollet that for the development of a prelachrymal abscess a preformed lymph space (described by Deval in 1849 as a synovial sac) plays a rôle. The differential diagnosis between prelachrymal tumor and ectasia of the lachrymal sac may present great difficulties. In the former the tear passages should be patulous, yet the writer has observed one case in which liquid injected into the upper canaliculus did not flow down to the nose because the prelachrymal tumor had compressed the sac. Nor is the prelachrymal tumor always movable. It is mostly due to caries and rarely arises from disease of the sac. BERGER.

(*To be continued.*)

Obituary.

January 9, 1903, Dr. **Photinos Panas,** professor of clinical ophthalmology at the medical faculty of the University of Paris, passed away at his beautiful country-seat of Roissy, where he so often entertained, with exquisite hospitality, Frenchmen, and foreigners of all nations. He was born in January, 1832, at Cephalonia, the present island of Samos. His father, a physician, gave him a very careful classical education. He was distinguished by extraordinary endowments and unusual working power. He was graduated with great distinction æt. twenty-two. His first works were chiefly devoted to surgical anatomy; his thesis was on the Anatomy of the Nasal Fossæ and the Tear-Passages, the diseases of which he studied later with unrivalled thoroughness and success. From this moment he nourished the hope that ophthalmology, some day, would also be represented in the medical faculties of the French universities. During the next years he prepared himself for the career of medical teacher. From 1859 to 1863 he gave courses on anatomy and operative medicine at the École pratique, in 1859 a public course on surgical anatomy, in 1860 a public course on the physiology of the nervous system and the sense organs, in 1861 a course on surgical pathology.

He had a hard time; his zeal for scientific and didactic labor retarded the creation of a clientage. Nélaton, Laugier, Guyon, and other distinguished professors were his friends. At the beginning of the war in 1870, Panas was surgeon at the Hôpital St. Louis, where he devoted himself to the relief of the unfortunate soldiers. In 1873 he was appointed by the faculty to give a complementary course on ophthalmology. At that time he published his *Lectures on Strabismus and Ocular Palsies.* In 1877

he was elected President of the Surgical Society, and entered the Academy of Medicine in the section of Medical Pathology. In 1879 new chairs were created and Panas was at once appointed to that of ophthalmology. The equipment of his service was meagre at the beginning, but by indefatigable labor he made it to be one of the best ophthalmological clinics, with an abundance of beds, a fine laboratory—his own creation,—from which very important investigations have emanated, some by his assistants under his auspices. In January, 1881, he founded, with LANDOLT and PONCET DE CLUNY, the *Archives d'ophtalmologie de langue française*, which has survived him as one of the important periodicals of its kind. He played a conspicuous rôle in the International Ophthalmological Congresses.

The character of Professor Panas was beyond praise. He was kind, sincere, indefatigable in the pursuit of his duties, and lenient with the shortcomings of his pupils. His operative skill and resourcefulness were of the highest order. He was an ardent advocate of the simple extraction of cataract, which he did with consummate dexterity and sagacious judgment ripened by great experience. Though the reviewer can not share all his views, he confesses that Panas was one of the most influential among his teachers. At the beginning of his professional career, Panas felt many gaps in his knowledge, but it was surprising to see how well he filled them up. When in foreign prints he found a good figure to clear up a knotty point he at once had it copied and embodied in his large collection of illustrations. They ornamented the walls in his clinical audience room. His lectures were interesting and instructive, his oratory was fluent and pointed.

The disease of which he died was insidious, and heart-rending in its course. Six years before his death, after an apparently insignificant accident, he noticed a slight weakness and waste in the muscles of his left hand. Though apparently of no consequence, he did not deceive himself, but recognized the symptoms of a progressive muscular atrophy of the Aran-Duchenne type. During six long years he noticed, without uttering a plaint, one group of muscles after another dwindle until those hands and arms of pristine fairy-like dexterity were powerless appendages to a calm, resigned heart and head, manifesting the dominating will of the great soul of a martyr.

If we consider his life from the standpoint of personal and political economy, we have to call it a complete success. To pass

judgment in this sense, we have to consider his family life and his productive work. His family and social life was of the happiest. His wife, a Greek also, brought up in England, though herself suffering for a time, was to him a most congenial consort. She shared his tastes and habits, unostentatiously appreciating his position and his worth. Nothing could surpass the mutual tender care which bound this couple together.

The scientific and practical work of Panas was of the highest order. He was the head of the modern French school of ophthalmology, preceded by the immortal benefactor of mankind, JACQUES DAVIEL, surrounded by GAYET, of Lyons, and others, and followed by a host of able pupils, of whom one, F. de Lapersonne, deservedly has been appointed his successor.

The *work* of Panas was grounded on his proficiency in anatomy and surgery. With this broad basis he turned his energy to the most prominent of the so-called specialties, which he mastered with astonishing rapidity and completeness, excelling, with logical sequence of his past, in the pathological and surgical departments of ophthalmology.

The chief publications of Panas are collected by Dr. de Lapersonne and published in the *Arch. d'ophtalmologie.* Most of them have been reviewed in the Systematic Reports on the Progress of Ophthalmology, in these ARCHIVES. His most important literary production, his *Traité des maladies des yeux*, in two volumes, 1894, deserves special mention. It is a fundamental work, in classical French, combining a liberal digest of the incident early and modern literature, French and foreign, with the independent views of an author of rare intelligence, erudition, and experience. This is the legacy which Panas left to posterity, and which, as De Lapersonne says, will stay as the French Mackenzie, the classical English treatise, which is read to-day, sixty years after the death of its author, with interest and profit by any thorough oculist.

H. KNAPP.

David Little, of Manchester, died November 27, 1902, in his sixty-third year. He studied in Edinburgh, was appointed house surgeon in the Ophthalmic Hospital at Manchester in 1863, was lecturer on ophthalmology in Owen's College from 1878 to 1899, president of the Ophthalmological Society of the United Kingdom in 1902. He was not a prolific writer, but a well-informed ophthalmologist and a judicious and skilled operator, particularly for

cataract. He was the first medical officer in the large, well-appointed and equipped modern eye hospital in Manchester, which compares well with the best eye hospitals in Great Britain. He was a frequent, welcome, and esteemed attendant of the International Ophthalmological Congresses.

Dr. **Isidor Herrnheiser,** Privatdocent, editor of the *Prager medicinischen Wochenschrift*, for many years the regular colaborer of these ARCHIVES, died of apoplexy at Prague, December 23, 1902. He was a capable and well-trained ophthalmologist, and published a number of excellent papers, for instance, "Retinitis Septica," "Metastatic Inflammations of the Eye," "On the Causes of Myopia in Youth."

Prof. **Alfred Graefe** died at Innsbruck, Tyrol, September 1, 1902. He was a cousin of Albrecht v. Gräfe, his pupil and assistant. He was professor of ophthalmology at the University of Halle, co-editor with Sämisch of the first edition of the *Handbuch der Ophthalmologie*, a fertile writer, especially on muscular anomalies. He resigned his professorship about five years before his death, on account of ill-health.

Dr. **J. W. May,** professor of ophthalmology and otology and dean of the College of Physicians and Surgeons at Kansas City, Mo., died September 29, 1902, æt. fifty-two.

Dr. **F. Despagnet,** of Paris, former chief of Galezowski's Clinic, secretary of the Recueil d'ophthalmologie, and secretary of the Paris Ophthalmological Society, died August 11, 1902.

Dr. **Tatchuchiro Inouye,** Jr., died at Tokio, Japan, in the fall of 1902.

Dr. **Nathaniel Feuer,** professor of ophthalmology, University of Buda-Pest, died November 25, 1902, aged fifty-eight.

APPOINTMENTS AND NEWS.

Appointed:

Dr. JOHN F. CARPENTER, instructor University of Pennsylvania.

Dr. CIRINCIONE, late professor in Palermo, now professor in University of Siena.

Dr. JAS. BORDLY, Jr., professor in Woman's Medical College, Baltimore.

Dr. ERNST HERTEL, professor in University of Jena.

Dr. GEO. HUSTON BELL, assistant surgeon New York Eye and Ear Infirmary.

Drs. A. G. THOMSON and CHAS. J. JONES, assistant surgeons, and Drs. HOMER J. RHODE and ARTH. J. BEDELL, resident physicians, Wills Hospital, Philadelphia.

Dr. J. A. WOODRUFF, ophthalmologist to St. Luke's Hospital, Chicago.

Dr. WILBUR B. MARPLE, surgeon New York Eye and Ear Infirmary.

Dr. A. N. ALLING, clinical professor Yale University.

Dr. BRAUNSCHWEIG, Halle, Germany, titular professor.

Mr. E. TREACHER COLLINS, ophthalmic surgeon and lecturer, Charing Cross Hospital and Medical School, London.

In the recently organized Post-Graduate Medical School, Washington, Drs. BURNETT, BETT, BUTLER, WILMER, FOX, and SHUTE are professors of ophthalmology, and DUFOUR adjunct professor.

Dr. SOLOMON KLEIN, professor, Vienna.

Dr. NAITO, attendant to Ophthalmic Hospital, Tokio.

Dr. ALLEN T. HAIGHT, E. F. SNYDACKER, W. O. NAUD, and C. W. HAWLEY, ophthalmologists to Cook County Hospital, Chicago.

Dr. ARNOLD KNAPP, professor of ophthalmology; Dr. WARD A. HOLDEN, chief of clinic and instructor; Dr. H. H. TYSON, instructor, at the College of Physicians and Surgeons, Columbia University.

Prof. C. SCHWEIGGER, of Berlin, celebrated the fiftieth anniversary of his doctorate.

The *Manhattan Eye and Ear Hospital* has opened a *Post-Graduate Course* in ophthalmology and otology. Duration: October 15th to July 15th. Dr. LEWIS A. COFFIN, Secretary.

BEQUESTS, GIFTS, AND PURCHASES.

Bequest of MARY LOUISE RUGGLES, of Boston, $3000, ANSON J. WHITE $10,000, and Mrs. N. E. BUSH $2000, together $15,000, to Massachusetts Charity Eye and Ear Infirmary.

Bequest of ALEX. C. HUTCHINSON, to Eye, Ear, Nose, and Throat Hospital, New Orleans, $20,000.

Bequest of WM. CLARK, to Newark Eye and Ear Infirmary, $6000.

Bequests of B. PACKER to Royal Westminster Ophthalmic Hospital and the Bath Eye Infirmary, each $2500.

A new building, 57 x 112′, will be added to the Episcopal Eye, Ear, and Throat Hospital of Washington, D. C.

Owing chiefly to the meritorious efforts of Dr. RICH. H. DERBY, executive surgeon of the New York Eye and Ear Infirmary, the Board of Health instituted regular school examinations of the eyes of the pupils, the outcome of which is, in a very great number of children, the discovery of follicular and granular conjunctivitis, mostly without or with only slight mucous, very rarely purulent, secretion. All these children were ordered to be treated by oculists in private or in eye dispensaries or eye hospitals. These institutions became so overcrowded that they had not space, time, and men enough to be equal to the occasion. To relieve them, the Board of Health dedicated Gouverneur Hospital for the treatment of these patients by paid oculists, while the eye hospitals treated as many as they could. The treatment consisted primarily by expression, with subsequent applications of collyria or touching with sulphate of copper, etc. As soon as the granules and the irritation had disappeared, and there was no longer any secretion, the children were admitted to the schools again on the certificates of the oculists who attended them, stating that there was no contagiousness. The disease is not at all alarming, and infectious only in a small number. Nevertheless the measures taken by the Board of Health are eminently praiseworthy, for even if the simple follicular and non-secreting granular forms are not contagious, they should be considered as being predisposed easily to catch infectious forms which, owing to the large immigration from infected countries, are rife enough in our poorer and unclean fellow-citizens. The results of the inspections and regulations of the Board of Health have been very successful, there now is neither an epidemic of trachoma, nor a dread of it, and the education of children is not materially interfered with, as the great majority of children directed to be treated can safely go to school again in about one or two weeks.

BOOK NOTICES.

VI.—**Biographic Clinics.** The Origin of the Ill-Health of De Quincey, Carlyle, Darwin, Huxley, and Browning. By GEORGE M. GOULD, M.D., Philadelphia. P. Blakiston & Co., 1012 Walnut Street, Philadelphia, Pa. Price $1.

The author of this nicely gotten-up book of 223 small 8vo pages presents the medical histories of the above distinguished men. They all exhibited great, unrestrained working power and broke down frequently; they recuperated temporarily when they discontinued their hard mental labor, by travelling and diversion, chiefly by walking and horseback riding. Resumption of their work was followed by a relapse of their old complaint, which always was cured again by the same remedy—out-of-door exercise and diversion. The author contends that it was not overwork and its consequences, but eye-strain. Reading and writing, being their chief occupation, brought about their complaint, viz., severe mental depression, indigestion, and weariness.

At the age of thirty-one, Huxley wrote: "I wish I could ascertain the exact *juste milieu* of work which will suit, not my head or will, for these can't have too much, but my absurd stomach." Open-air occupation and tramping always gave him immediate relief. He died June 29, 1895, at the age of seventy.

Our author has, with great industry, collected these and other data from authentic sources. They are interesting reading, but the reviewer cannot agree with the views of the author. Huxley noticed that at the age of thirty-nine he held his book farther than he used to do, and glasses did not help him much. It is certain, says Dr. Gould, that he had far-sighted astigmatism of 1 or 2 D at least, furthermore anisometropia and esophoria, with normal vision. Every oculist knows that hyperopic esophoria, especially if combined with astigmatism, causes asthenopia with

more or less reflex phenomena in the head and other parts of the body, but the reviewer thinks that Dr. Gould goes too far in trying to prove that all the symptoms of Huxley and the other great men he cites were dependent on errors of refraction. Digestive and circulatory troubles are very common in brain workers with sedentary habits. The reviewer has had many opportunities to examine the eyes of such men, but he failed to find refractive errors to account for their complaints, though they were zealous investigators, using instruments of precision, and were great readers and prolific writers. Their eyes mostly were normal or myopic. Their chief remedy to keep in good health consisted in daily walks of an hour or two, and a summer vacation of two or three months in the Alps. H. KNAPP.

Fig. 1.

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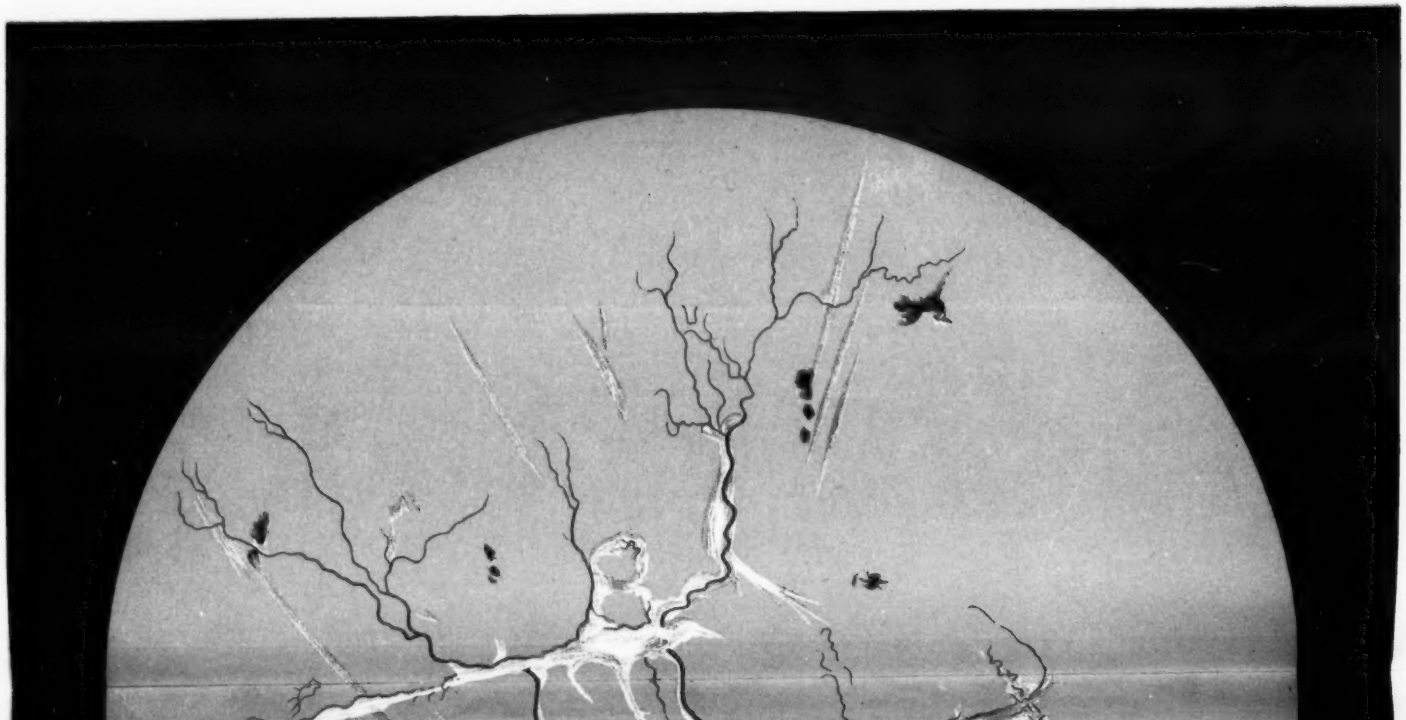
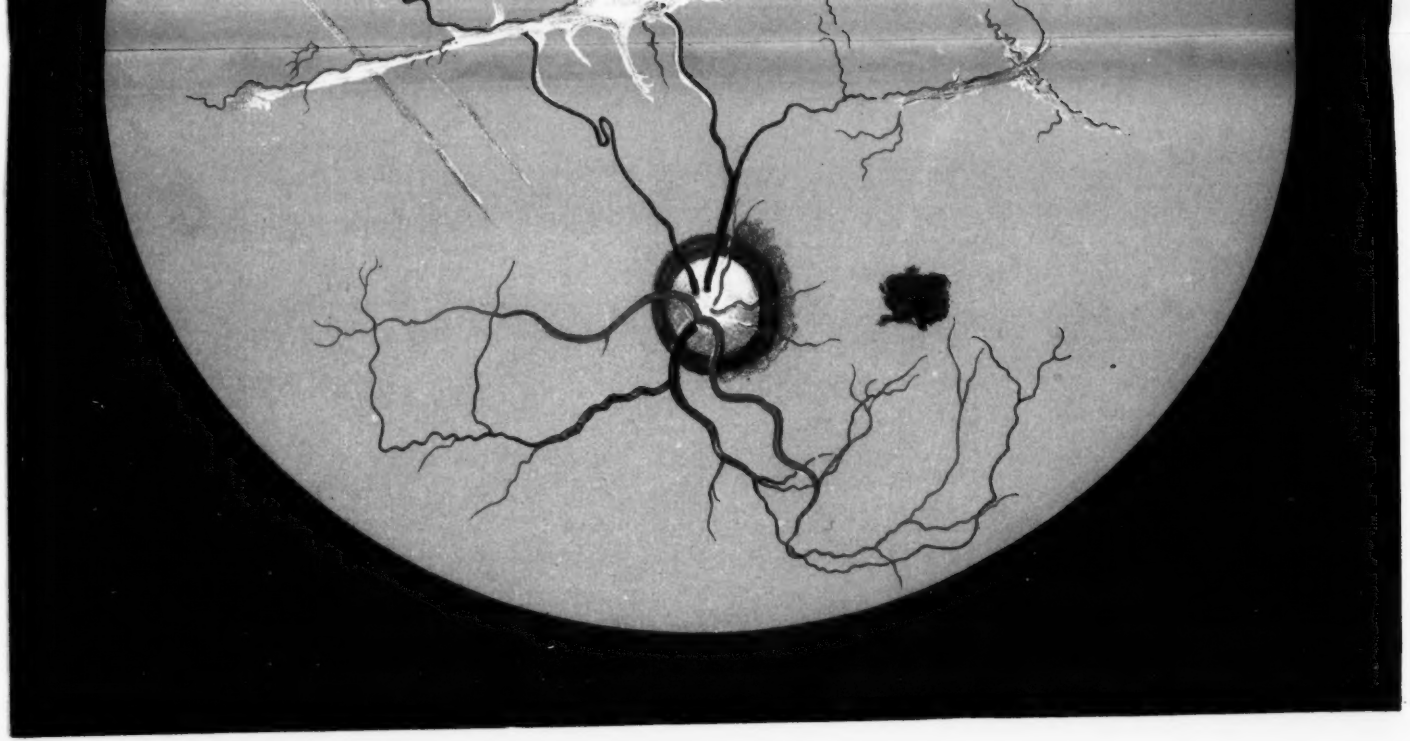
Fig. 2





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